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LOUISVILLE DISTRICT / HUNTINGTON DISTRICT

Ohio River Mainstem Systems Study (ORMSS)

Interim Feasibility Report:
J.T. Myers and Greenup Locks Improvements

INDIANA, KENTUCKY and OHIO

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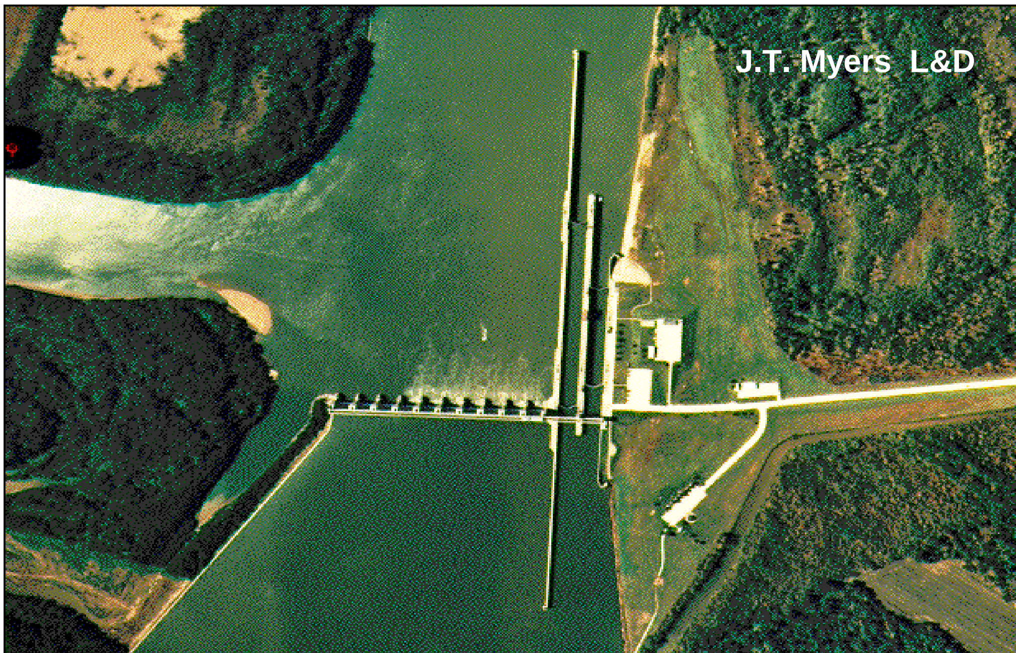

April 2000

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
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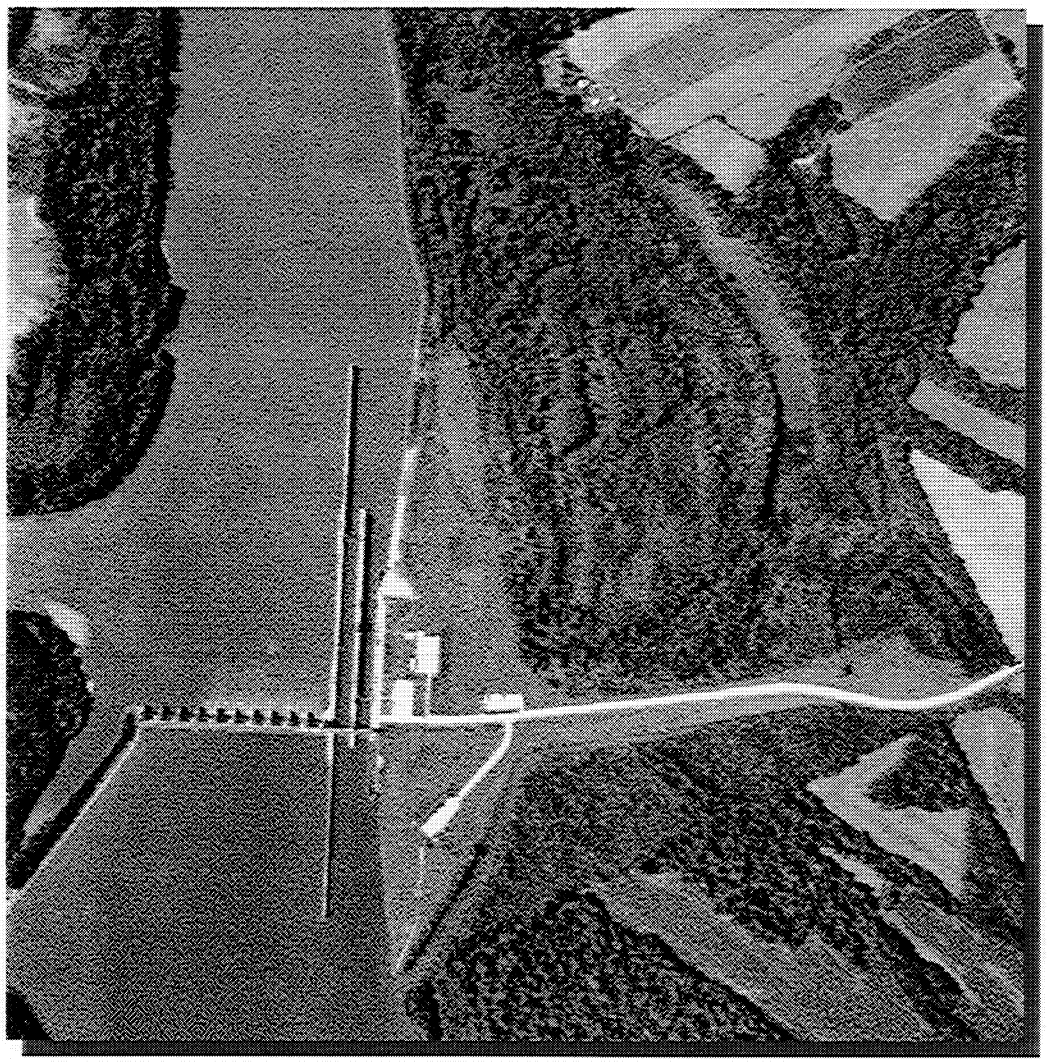
RE	**Real Estate Appendix**
PE	**Plan Formulation & General Engineering Reference Data**
ED-1	**J.T.Myers Engineering Site Appendix**
ED-2	**Greenup Engineering Site Appendix**

J.T. Myers Locks Improvements

Part A-1. Site-Specific Environmental Impact Assessment

SITE SPECIFIC ENVIRONMENTAL IMPACT ASSESSMENT
J. T. MYERS LOCKS AND DAM
POSEY COUNTY, INDIANA
OHIO RIVER MAINSTEM STUDY



Submitted to

US Army Corps of Engineers
Louisville District

Louisville, Kentucky

Submitted by

GEC
Gulf Engineers & Consultants

Baton Rouge, Louisiana

August 1999

Gulf Engineers & Consultants

August 1999

Final Report

SITE SPECIFIC ENVIRONMENTAL IMPACT ASSESSMENT J. T. MYERS LOCKS AND DAM POSEY COUNTY, INDIANA OHIO RIVER MAINSTEM STUDY

Contract No. DACW27-97-D-0013
Delivery Order No. 0015
GEC Project No. 24321217

Submitted to

U.S. Army Corps of Engineers
Louisville District
Louisville, Kentucky

Submitted by

G.E.C., Inc.
Baton Rouge, Louisiana

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1.0 INTRODUCTION, PURPOSE AND NEED

G.E.C., Inc. (Gulf Engineers and Consultants) is currently under contract with the Louisville District, U.S. Army Corps of Engineers to prepare a Site Specific Environmental Impact Assessment (EIA) of the proposed expansion of the northern most existing lock at the J.T. Myers Locks and Dam, located on the Ohio River at approximate River Mile 846 (Figure 1). The purpose of this work is to identify potential impacts to wetlands, threatened and endangered species, and terrestrial habitat, as well as to identify concept level costs associated with disposal of dredge material, and with mitigation projects. Work was conducted under Contract No. DACW27-97-D-0013, Delivery Order No. 0017.

This document is divided into six major sections, including the Introduction, Purpose and Need (1.0). Section 2.0, Proposed Alternatives, provides a detailed description of the proposed disposal alternatives, including the no-action alternative. Section 3.0, Cost Analysis, includes the results of the cost effectiveness and incremental cost analysis performed for each alternative. Data are presented for each alternative and summarized in this section. Cost data for each alternative are summarized in tabular form for quick reference and includes all alternatives. Section 4.0, Environmental Impact Assessment, is subdivided into two sections. Section 4.1 provides a description of baseline conditions at the J.T. Myers Locks and Dam site, as well as the proposed off-site disposal areas. Section 4.2 includes an assessment of the potential impacts from the disposal of dredge material on wetlands, terrestrial habitat, and threatened and endangered species, and is further divided into three sub-sections respectively. Section 5.0, Summary and Conclusion, provides a brief summary of the results, and a conclusion statement. Section 6.0, Figures, contains all figures referenced in the body of the report. Following Section 6.0 are the appendices referenced throughout the report. Appendix A contains a copy of the wetland delineation report; Appendix B is a copy of the Biological Evaluation performed initially in 1998; Appendix C is the Habitat Evaluation Procedure (HEP) report; and Appendix D is the Biological Assessment.

The U.S. Army Corps of Engineers is currently conducting the Ohio River Main Stem Systems Study (ORMSS) to identify the best long-term agenda for maintaining a viable navigation system on the main-stem of the Ohio River. Specifically, the study is evaluating the Operation and Maintenance, Major Maintenance, Major Rehabilitation and New Construction investment needs for the 19 navigation locks and dams on the Ohio River Main Stem, with an aim to identify the optimum plan for meeting these needs over the next 40-50 years. As traffic grows through the Ohio River Valley, several lock structures will experience increasing delays which could be particularly severe during times of maintenance. Other locks will become increasingly unreliable due to age and cycles of use.

The ORMSS final report (due for completion in 2001) is intended to be an authorization document for near-term needs (over the next 10-15 years) and a Master Plan for long-term needs. During the course of the study, a clear justification was found for authorization of large-scale improvements at two Ohio River facilities, J.T. Myers Locks and Dam, and Greenup Lock and Dam. An interim report is being prepared to provide a rationale for proceeding to Congressional authorization for these improvements in advance of the final ORMSS report.

In terms of both traffic levels and delays, J.T. Myers Locks and Dam is one of the two busiest lock projects on the Ohio River for which major improvements are not already underway or authorized. Second only to Smithland Lock and Dam, which is located about 80 miles downstream of J.T. Myers, J.T. Myers Locks and Dam is the busiest in the U.S. in terms of traffic volume. However, Smithland Lock and Dam has two 1,200-foot long locks to efficiently process long commercial tows, whereas J.T. Myers Locks and Dam has only one 1,200-foot chamber, and a smaller 600-foot auxiliary lock.

When both lock chambers at J.T. Myers are functioning normally, the capacity of the existing facility is generally adequate to serve traffic levels both now and over the next 10 to 20 years. However, delays occur when several tows arrive at the lock simultaneously. During the last three years, the average delay per tow at J.T. Meyers is approximately 45 minutes, whereas at the larger Smithland Locks (which has twin 1,200 foot chambers and about the same traffic level) the delay is approximately 10 minutes per tow. Given the fact that about 6,200 tows per year transit J.T. Myers Locks and Dam, the delay costs attributable to not having a second 1,200 foot lock chamber at J.T. Myers is approximately $1.5 million per year (for a year in which no major maintenance occurs at the facility).

In general, having a second full-size (1,200 foot long) chamber at J.T. Myers Locks and Dam would yield a reduction in tow transit costs on a day-in, day-out basis, and the value of this benefit would grow over time as traffic levels increase. This benefit would be most noticeable when it becomes necessary to close one of the locks for maintenance or emergency purpose.

2.0 PROPOSED ALTERNATIVES

J.T. Myers Locks and Dam would be upgraded by constructing an extension of the existing 600-foot lock to provide an additional 1,200-foot lock. Figures 2 through 7 provide a plan view of the proposed construction and a proposed construction sequence. These figures were generated and provided by the Louisville District, U.S. Army Corps of Engineers (USACE).

Construction activities would also include removal of an approximate 2,100-foot long portion of the right descending bank (100-foot wide with the exception of the first and last 300 feet which is 50-foot wide) downstream of the locks and dams to improve lower approach access (Figure 8), construction of an access road, and construction of a temporary staging area. The staging area would be used during construction of the project and restored to pre-project conditions upon project completion. The proposed activities would generate approximately 500,000 cubic yards of dredge material (clay, sand, and silt) that would require disposal. Four disposal alternatives are being considered, including the No-Action Alternative: (1) On-Site Disposal (Preferred Alternative); (2) Off-Site Disposal on State Owned Lands; (3) Off-Site Disposal on Private Property and (4) No-Action. Within each of the three action alternatives, two alternate disposal plans exist, contemporary (spread out material to the extent possible without impacting wetlands or heavily wooded areas) and beneficial use for environmental enhancement/restoration. The USACE owns the entire site included in Alternative 1. However, the areas included in alternatives 2 and 3 are owned by the State of Indiana and private ownership, respectively. Therefore, prior to finalization of any plan, the property would have to be purchased or a mutual agreement needed between the USACE and the property owner. The following subsections describe each alternative disposal site and alternative disposal design.

2.1 Alternative 1. On-Site Disposal (Preferred Alternative)

On-site disposal would be confined primarily to the southern portion of the approximately 400-acre site adjacent to the existing J.T. Myers Locks and Dam (Figure 9). Within the approximate 400-acre tract, approximately 100 acres were designated as potential disposal areas. These areas were designated to avoid and/or minimize impacts to mature bottomland hardwoods, and to avoid impacts to wetlands present on-site. The habitats present within the proposed disposal areas on-site include an open prairie, ash/hackberry scrub shrub, and frequently maintained (mowed) open grassland. The prairie was established by the USACE in partnership with the Indiana Department of Natural Resources as a restoration project under Section 1135 of the Water Resources Development Act of 1986. It is made up of a mixture of native prairie grasses and range plants. It is easily recognized by the presence of little and big bluestem as well as other annuals and perennials.

The ash/hackberry scrub is located along the maintained clearing and prairie areas are comprised of American elm, hackberry and green ash saplings with a dense understory of leadplant, poison ivy, and various perennials and annuals. It appears that these areas may have been cleared for agricultural use prior to Corps ownership.

Based on a wetland delineation performed in May 1999 (Appendix A), no wetlands are present within the proposed on-site disposal area. Figure 10 shows the location of wetlands in relationship to the proposed on-site disposal area.

2.1.1 Contemporary Design. Under this alternative disposal design, approximately 500,000 cubic yards of material would be deposited over approximately 100 acres [20.4 acres of prairie, 69 acres of frequently maintained open grassland, and approximately 11 acres of scrub shrub habitat (Figure 9)]. Upon project completion, the prairie and the frequently maintained open grassland would be restored using the original project specifications. The scrub shrub area would be re-planted using a mixture of indigenous bottomland hardwood species.

2.1.1.1 Planting. The following is a general plan for restoration of filled lands back to bottomland hardwoods, as is proposed under this alternative disposal design, including proposed species composition to be planted.

- **Species**

  A mixture of at least 65 percent hard-mast and a maximum of 35 percent soft-mast producing species would be planted. Depending on availability, species to be planted would typically consist of some combination of the following:

Shagbark hickory	Shumard oak
Bur oak	Swamp chestnut oak
Chinkapin oak	Green ash
Overcup oak	Common persimmon
Water hickory	Red maple

- **Site Preparation**

  Areas to be planted would be prepared by mechanical or chemical means (herbicide application), controlled burning or any combination thereof, depending on site conditions.

- **Planting Density**

  Seedlings would be planted on 12-foot centers for a total initial stand density of at least 302 trees per acre.

- **Planting Configuration**

  Species selected for planting would be planted randomly as dictated by terrain and physical characteristics of the soil to promote biodiversity.

- **Maintenance**

  Planted sites would be maintained on an as needed basis, utilizing mechanical or chemical means or a combination thereof.

- **Protection**

  Seedlings would be protected to prevent damage from herbivores when evidence warrants. Wire mesh fencing or a suitable substitute would be installed around planted seedlings at the time of planting.

- **Planting Success Criteria**

  A target minimum of 50 percent or 151 seedling per acre, must survive through the end of the second growing season following the planting. This criterion would apply to initial plantings as well as subsequent replanting, which may be needed.

- **Monitoring**

  The responsible agency (USACE or IDNR) should conduct a seedling survival survey at or near the end of the second growing season following planting of a tract. Ten percent of the planted seedlings would be tallied on tracts of three acres or less. A random survival survey accounting for at least five percent of the total number of seedlings planted in a tract would be conducted on tracts greater than three acres in size. A sufficient number of one-hundredth acre plots would be randomly established, depending on the size and configuration of the tract, but must be representative of the tract. In addition, a cursory examination of the entire planted tract should be performed to determine if overall survival is adequate.

- **Continuous Forest Monitoring**

  Continuous monitoring of the planted tracts at five-year intervals upon the attainment of the Year 2 criterion should be performed. A sufficient number of one-tenth acre permanent continuous forest monitoring plots would then be established to represent a one-percent sample of the planted tracts. Each plot center would be permanently marked; all trees within the plot would be numbered and permanently tagged. Data to be collected and recorded should include, at a minimum, the number of trees present within the plot, species composition, height, and diameter of tagged trees within each plot. The general health of the planted trees and overall stand health should also be recorded during the monitoring.

2.1.2 Beneficial Use for Environmental Restoration. Originally it was proposed that the dredge material be used to construct a series of levees throughout the site to create greentree reservoirs for waterfowl management. However, after a thorough on-site reconnaissance it was determined that a sufficient amount of natural levees and man-made roads exist on the site; and that management of the hydroperiod through a control structure in the southwest portion of the site, which is maintained by the Hovey Lake Manager, has created a setting for a majority of the site to function as a greentree reservoir in the winter. Further, it was discussed that the impacts associated with construction of levees would not justify the benefits gained through creation of a greentree reservoir in this area. Therefore, this alternative disposal design was eliminated from further consideration.

2.2 Alternative 2. Off-Site Disposal On State Owned Lands

Indiana Department of Natural Resources (IDNR) owns an approximate 143 acre tract located northeast of Hovey Lake (Figure 11). This area is currently under an agriculture outlease and is planted in row crops including soybeans, and corn depending on the market and on-site conditions. Portions of this area undergo periodic flooding.

2.2.1 Contemporary Design. Under this alternative disposal design, the area would receive approximately 500,000 cubic yards of material. The material would be evenly spread to raise the elevation approximately two feet and the area would continue to be farmed.

2.2.2 Beneficial Use for Environmental Restoration. Under this alternative disposal design, a series of small levees would be constructed to create cells to be managed as moist soil units for waterfowl management. The water levels would be controlled by a series of control structures, and they would be inundated to approximately 12 inches beginning in the fall and gradually released by the early spring. Specific location and design of levees, and the number of water-control structures required would be generated at a later date once contour maps of the area are developed. It is not anticipated that construction of the levees would utilize the entire amount of material generated (500,000 cubic yards), and therefore this method would include some of the contemporary design.

2.3 Alternative 3. Off-Site Disposal On Private Property

The USACE has selected an alternate disposal site for evaluation that is adjacent to the existing lock and dam site and borders State owned lands that are managed by IDNR. This approximately 467-acre tract (Figure 11) contains a mixture of bottomland hardwoods and open agriculture fields.

2.3.1 Contemporary Design. Under the contemporary design the areas currently being farmed would receive approximately 500,000 cubic yards of material. The material would be evenly spread over approximately 263 acres (open agriculture land) to raise the elevation approximately one foot, and the area would continue to be farmed.

2.3.2 Beneficial Use for Environmental Restoration. Under this alternative, the areas currently being farmed would receive approximately 500,000 cubic yards of material. The material would be evenly spread over approximately 263 acres to raise the elevation approximately one foot and the area would be restored to bottomland hardwoods. The intent of the restoration would be to reduce forest fragmentation in the area and provide additional wildlife habitat. This would also provide a wildlife corridor to adjacent wooded tracts. Species composition and concept planting specifications proposed are the same as outlined in Section 2.1.1.1.

3.0 COST ANALYSIS

3.1 Introduction

The purpose of this section is to conduct and present the findings of a cost effectiveness and incremental cost analysis of the five disposal alternatives under consideration. These cost analyses are not intended to determine the best alternative, but instead, are intended to provide decision makers with a comparison of alternatives that produce different levels of environmental outputs and assist them in choosing the alternative that best satisfies project objectives. The analyses are intended to improve the quality of decision making when considering alternative plans for producing environmental outputs.

As the name implies, cost effectiveness analysis is a process that compares alternative plans that produce environmental outputs and determines which plan can produce the largest quantity of output for a given cost, or produce the same or greater quantity of output for less cost. Cost effectiveness analysis determines if: (1) the same environmental output level could be produced by another plan at less cost; (2) a larger environmental output level could be produced at the same cost; or (3) a larger environmental output level could be produced at less cost. For instance, if two alternatives produce the same amount of environmental outputs, the alternative with the lowest costs is considered cost effective. Likewise, if the costs of two alternatives are equal, but one produces more outputs than the other, the one producing the higher level of outputs would be the cost effective alternative. Also, an alternative that costs less and produces higher levels of output is considered to be cost effective compared to higher cost alternatives producing lower levels of output.

Incremental cost analysis builds on the findings of the cost effectiveness analysis. This is accomplished by comparing the increase in costs to the increase in outputs that are associated with advancing from one output level (one cost effective alternative) to the next higher output level (another cost effective alternative). Since the no-action alternative produces no change in outputs, the concept of incremental cost is not applicable to that alternative.

Costs and quantities were developed for purposes of comparing and contrasting disposal alternatives. While analysis attempted to approximate actual costs and quantities, it is likely that final numbers will be at least slightly different. It is not anticipated that differences between estimated and actual numbers will negate conclusions, herein. However, this logic will be revisited prior to construction.

3.2 Preliminary Cost Estimates of Disposal Alternatives

To conduct cost effectiveness and incremental cost analyses, the total cost of implementing each disposal alternative must be estimated and stated on an annual basis. The preliminary cost estimates developed for each alternative were generated using information obtained from R.S. Means "Building Construction Cost Data," which was adjusted to reflect local conditions. The cost estimates include a contingency fee, an engineering, planning and design fee, and a construction management fee. The contingency fee was estimated as 12 percent of the subtotal costs (for an example of the items included in the subtotal costs see Table 3-1). The engineering, planning and design fee was estimated as 10 percent of the subtotal costs and the contingency fee, and the construction management fee was estimated as seven percent of the subtotal costs and the contingency fee. <u>The cost estimates exclude dredging and lock construction costs and the placing of the dredge material in an on-site stockpile; actions that will be required regardless of which disposal</u>

alternative is chosen. The cost estimates address only the disposal and subsequent site preparation work required for each alternative.

Table 3-1. J.T. Myers Locks and Dam, Site Specific Environmental Impact Assessment, Alternative 1, On-Site Disposal Costs

Cost Item	Quantity	Unit	Cost	Amount
Strip & stockpile 20 Ac for prairie seedbank	16,133	Cubic Yards	$0.83	$13,390
Spread fill from stockpile	500,000	Cubic Yards	$2.25	$1,125,000
Grade fill	500,000	Cubic Yards	$1.32	$660,000
Tilling fill material into topsoil	100	Acres	$148.13	$14,813
Replant 11 Ac in bottomland hardwood				
65 percent hard-mast	2,159	Trees	$0.23	$486
35 percent soft-mast	1,163	Trees	$0.22	$250
Plant bare root seedlings 17"-24"	3,322	Trees	$1.75	$5,814
Spread stockpiled prairie seedbank				
Spread	16,133	Cubic Yards	$2.25	$36,299
Grade	16,133	Cubic Yards	$1.32	$21,296
Reseed 69 Ac of open grassland	69.0	Acres	$10.17	$702
Subtotal Costs				$1,878,049
Contingencies (12%)				$225,366
Engineering, Planning, and Design (10%)				$210,341
Construction management (7%)				$147,239
Total Costs				**$2,460,995**

Sources: R.S. Means Building Construction Cost Data, 1999; G.E.C., Inc., 1999.

3.2.1. Alternative 1. On-Site Disposal Contemporary Design. Total disposal cost of implementing Alternative 1 is estimated at $2,460,995 (Table 3-1). These costs include stripping 6" of topsoil (16,133 cubic yards) from a 20 acre plot and stockpiling for use as prairie seedbank; spreading, grading, and tilling 500,000 cubic yards of dredge material; replanting 11 acres of bottomland hardwood; spreading and grading the topsoil stockpiled at the beginning of the process, and reseeding 69 acres of open grassland. Once the dredge material is spread and graded, it will be tilled in with the topsoil to maintain site productivity. It was assumed that the soil would be worked with a subsoil cultivator or V-ripper twice for every foot-depth of disposal material placed at the site. The total depth of dredge material spread over the 100 acres is estimated at three feet. The cost of replanting the bottomland hardwoods included the cost of purchasing and planting 17" to 24" bare root seedlings consisting of 65 percent hard-mast and 35 percent soft-mast, at a planting rate of 302 seedlings per acre.

3.2.2. Alternative 2. Off-Site Disposal on State-Owned Land, Contemporary Design. Total disposal cost of implementing Alternative 2 is estimated at $9,436,001 (Table 3-2). These costs include land easement; stripping 6" of topsoil (16,133 cubic yards) from a 20 acre plot and stockpiling for use as prairie seedbank at the on-site location; loading and hauling 500,000 cubic yards of dredge material from the dredge stockpile to the off-site location (20 miles roundtrip); spreading, grading, and tilling the dredge material; and spreading and grading the topsoil at the on-site location that was stockpiled at the beginning of the process. A daily allowance for dust control measures, associated with handling and hauling the dredge material offsite, is also included.

Table 3-2. J.T. Myers Locks and Dam, Site Specific Environmental Impact Assessment, Alternative 2, Off-Site Disposal on State-Owned Land, Contemporary Design Costs

Cost Item	Quantity	Unit	Cost	Amount
Land easement	143	Acres	$390.00	$55,770
Strip & stockpile 20 Ac for prairie seedbank (on-site)	16,133	Cubic Yards	$0.83	$13,390
Load fill material on trucks	500,000	Cubic Yards	$1.70	$850,000
Haul material off-site (20 mile roundtrip)	500,000	Cubic Yards	$10.69	$5,345,000
Grade fill	500,000	Cubic Yards	$1.32	$660,000
Dust control	256	Days	$800.70	$204,979
Tilling fill material into topsoil	143	Acres	$98.75	$14,121
Spread stockpiled prairie seedbank				
Spread	16,133	Cubic Yards	$2.25	$36,299
Grade	16,133	Cubic Yards	$1.32	$21,296
Subtotal Costs				$7,200,856
Contingencies (12%)				$864,103
Engineering, Planning, and Design (10%)				$806,496
Construction management (7%)				$564,547
Total Costs				**$9,436,001**

Sources: R.S. Means Building Construction Cost Data, 1999; G.E.C., Inc., 1999.

Once the dredge material is spread and graded at the off-site location, it will be tilled in with the topsoil to maintain site productivity. It was assumed that the soil would be worked with a subsoil cultivator or V-ripper twice for every foot-depth of disposal material placed at the site. The total depth of dredge material spread over the 143 acres is estimated at two feet. The stripping and stockpiling, and the spreading and grading of topsoil at the on-site location is required in order to restore the area used to stockpile the dredge material prior to hauling it off-site.

3.2.3. Alternative 2a. Off-Site Disposal on State-Owned Land, Environmental Benefit Design. Total disposal cost of implementing Alternative 2a is estimated at $11,005,205 (Table 3-3). These costs include land easement; stripping 6" of topsoil (16,133 cubic yards) from a 20 acre plot and stockpiling for use as prairie seedbank at the on-site location; loading and hauling 500,000 cubic yards of dredge material from the dredge stockpile to the off-site location (20 miles roundtrip); spreading, grading, and tilling the dredge material; and spreading and grading the topsoil at the on-site location that was stockpiled at the beginning of the process. A daily allowance for dust control measures, associated with handling and hauling the dredge material offsite, is also included.

Once the dredge material is spread and graded at the off-site location, it will be tilled in with the topsoil to maintain site productivity. It was assumed that the soil would be worked with a subsoil cultivator or V-ripper twice for every foot-depth of disposal material placed at the site. The total depth of dredge material spread over the 143 acres is estimated at two feet. After tilling, a series of small levees would be constructed to allow the creation of moist soil units for waterfowl management. The cost of compacting, watering, and grading the levees are included in the estimate. The stripping and stockpiling, and the spreading and grading of topsoil at the on-site location is required in order to restore the area used to stockpile the dredge material prior to hauling it off-site.

Table 3-3. J.T. Myers Lock and Dam, Site Specific Environmental Impact Assessment, Alternative 2a, Off-Site Disposal on State-Owned Land, Environmetnal Benefit Design Costs

Cost Item	Quantity	Unit	Cost	Amount
Land easement	143	Acres	$390.00	$55,770
Strip & stockpile 20 Ac for prairie seedbank (on-site)	16,133	Cubic Yards	$0.83	$13,390
Load fill material on trucks	500,000	Cubic Yards	$1.70	$850,000
Haul material off-site (20 mile roundtrip)	500,000	Cubic Yards	$10.69	$5,345,000
Grade fill	500,000	Cubic Yards	$1.32	$660,000
Dust control	256	Days	$800.70	$204,979
Tilling fill material into topsoil	143	Acres	$98.75	$14,121
Construct levees				
Compaction	250,000	Cubic Yards	$0.15	$37,500
Water truck	250,000	Cubic Yards	$1.56	$390,000
Grade and subgrade	250,000	Cubic Yards	$3.08	$770,000
Spread stockpiled prairie seedbank				
Spread	16,133	Cubic Yards	$2.25	$36,299
Grade	16,133	Cubic Yards	$1.32	$21,296
Subtotal Costs				$8,398,356
Contingencies (12%)				$1,007,803
Engineering, Planning, and Design (10%)				$940,616
Construction management (7%)				$658,431
Total Costs				**$11,005,205**

Sources. R.S. Means Building Construction Cost Data, 1999; G.E.C., Inc., 1999.

3.2.4 Alternative 3. Off-Site Disposal on Private Property, Contemporary Design. Total disposal cost of implementing Alternative 3 is estimated at $6,857,544 (Table 3-4). These costs include land acquisition; stripping 6" of topsoil (16,133 cubic yards) from a 20 acre plot and stockpiling for use as prairie seedbank at the on-site location; loading and hauling 500,000 cubic yards of dredge material from the dredge stockpile to the off-site location (five miles roundtrip); spreading, grading, and tilling the dredge material; and spreading and grading the topsoil at the on-site location that was stockpiled at the beginning of the process. A daily allowance for dust control measures, associated with handling and hauling the dredge material offsite, is also included.
Once the dredge material is spread and graded at the off-site location, it will be tilled in with the topsoil to maintain site productivity. It was assumed that the soil would be worked with a subsoil cultivator or V-ripper twice for every foot-depth of disposal material placed at the site. The total depth of dredge material spread over the 263 acres is estimated at one foot. The stripping and stockpiling, and the spreading and grading of topsoil at the on-site location is required in order to restore the area used to stockpile the dredge material prior to hauling it off-site.

Table 3-4. J. T. Myers Lock and Dam, Site Specific Environmental Impact Assessment, Alternative 3, Off-Site Disposal on Private-Owned Land, Contemporary Design Costs

Cost Item	Quantity	Unit	Cost	Amount
Land Acquisition	467	Acres	$1,300.00	$607,100
Strip & stockpile 20 Ac for prairie seedbank (on-site)	16,133	Cubic Yards	$0.83	$13,390
Load fill material on trucks	500,000	Cubic Yards	$1.70	$850,000
Haul material off-site (5 mile roundtrip)	500,000	Cubic Yards	$5.84	$2,920,000
Grade fill	500,000	Cubic Yards	$1.32	$660,000
Dust control	140	Days	$800.70	$112,098
Tilling fill material into topsoil	263	Acres	$49.38	$12,986
Spread stockpiled prairie seedbank				
Spread	16,133	Cubic Yards	$2.25	$36,299
Grade	16,133	Cubic Yards	$1.32	$21,296
Subtotal Costs				$5,233,169
Contingencies (12%)				$627,980
Engineering, Planning, and Design (10%)				$586,115
Construction management (7%)				$410,280
Total Costs				**$6,857,544**

Sources: R.S. Means Building Construction Cost Data, 1999; G.E.C., Inc., 1999.

3.2.5 Alternative 3a. Off-Site Disposal on Private Property, Environmental Benefit Design

Total disposal cost of implementing Alternative 3a is estimated at $7,062,738 (Table 3-5). These costs include land acquisition; stripping 6" of topsoil (16,133 cubic yards) from a 20 acre plot and stockpiling for use as prairie seedbank at the on-site location; loading and hauling 500,000 cubic yards of dredge material from the dredge stockpile to the off-site location (5 miles roundtrip); spreading, grading, and tilling the dredge material; and spreading and grading the topsoil at the on-site location that was stockpiled at the beginning of the process. A daily allowance for dust control measures, associated with handling and hauling the dredge material offsite, is also included.

Once the dredge material is spread and graded at the off-site location, it will be tilled in with the topsoil to maintain site productivity. It was assumed that the soil would be worked with a subsoil cultivator or V-ripper twice for every foot-depth of disposal material placed at the site. The total depth of dredge material spread over the 263 acres is estimated at one foot. After tilling, 263 acres would be restored to bottomland hardwoods in order to reduce forest fragmentation in the area and provide additional wildlife habitat. The cost of the restoration of the bottomland hardwoods included the cost of purchasing and planting 17" to 24" bare root seedlings consisting of 65 percent hard-mast and 35 percent soft-mast, at a planting rate of 302 seedlings per acre. The stripping and stockpiling, and the spreading and grading of topsoil at the on-site location is required in order to restore the area used to stockpile the dredge material prior to hauling it off-site.

Table 3-5. J. T. Myers Lock and Dam, Site Specific Environmental Impact Assessment, Alternative 3a, Off-Site Disposal on Private-Owned Land, Environmental Benefit Design Costs

Cost Item	Quantity	Unit	Cost	Amount
Land Acquisition	467	Acres	$1,300.00	$607,100
Strip & stockpile 20 Ac for prairie seedbank (on-site)	16,133	Cubic Yards	$0.83	$13,390
Load fill material on trucks	500,000	Cubic Yards	$1.70	$850,000
Haul material off-site (5 mile roundtrip)	500,000	Cubic Yards	$5.84	$2,920,000
Grade fill	500,000	Cubic Yards	$1.32	$660,000
Dust control	140	Days	$800.70	$112,098
Tilling fill material into topsoil	263	Acres	$49.38	$12,986
Replant 263 Ac in bottomland hardwood				
65 percent hard-mast	51,627	Trees	$0.23	$11,616
35 percent soft-mast	27,799	Trees	$0.22	$5,977
Plant bare root seedlings 17"-24"	79,426	Trees	$1.75	$138,996
Spread stockpiled prairie seedbank				
Spread	16,133	Cubic Yards	$2.25	$36,299
Grade	16,133	Cubic Yards	$1.32	$21,296
Subtotal Costs				$5,389,757
Contingencies (12%)				$646,771
Engineering, Planning, and Design (10%)				$603,653
Construction management (7%)				$422,557
Total Costs				**$7,062,738**

Sources: R.S. Means Building Construction Cost Data, 1999; G.E.C., Inc., 1999.

3.3 Average Annual Cost

Table 3-6 presents a summary of the preliminary cost estimates for the five alternatives. The average annual cost of implementing each alternative, assuming a 50-year project life and a federal discount rate of 6.875 percent, is also presented. The average annual cost is the annual amount required to amortize the present value of project costs over the life of the project. It is equivalent to the annual mortgage payment needed to finance the project over 50 years at 6.875 percent interest. Estimates of average annual income expected to be generated from agricultural leases under the contemporary designs of alternatives 2 and 3, and the net average annual costs of each alternative are included. The net average annual costs were calculated as the average annual costs of implementing the alternative minus the average annual agricultural lease income.

The average annual cost for Alternative 1, On-Site Disposal, is $175,510. No agricultural lease income will be generated under this alternative.

The average annual cost for Alternative 2, Off-Site Disposal on State-Owned Land, Contemporary Design, is $672,945. The average annual agricultural lease income was estimated at $11,011. This income estimate was based on existing agricultural lease payments received by the state of $77 per acre per year, applied to 143 acres. Adjusting the average annual cost to account for the agricultural lease income results in a net average annual cost of $661,934 for this alternative.

Table 3-6. J. T. Myers Lock and Dam, Site Specific Environmental Impact Assessment, Alternative Disposal Costs

Cost Item	Alternatives				
		Off-Site			
		State-Owned Land		Privately-Owned Land	
	On-Site	Contemporary	Env. Benefit	Contemporary	Env. Benefit
Land acquisition/easement	$0	$55,770	$55,770	$607,100	$607,100
Strip & stockpile 20 Ac for prairie seedbank (on-site)	$13,390	$13,390	$13,390	$13,390	$13,390
Load fill material on trucks	$0	$850,000	$850,000	$850,000	$850,000
Haul material off-site	$0	$5,345,000	$5,345,000	$2,920,000	$2,920,000
Spread fill from stockpile	$1,125,000	$0	$0	$0	$0
Grade fill	$660,000	$660,000	$660,000	$660,000	$660,000
Dust control	$0	$204,979	$204,979	$112,098	$112,098
Tilling fill material into topsoil	$0	$14,121	$14,121	$12,986	$12,986
Replant bottomland hardwood					
65 percent hard-mast	$486	$0	$0	$0	$11,616
35 percent soft-mast	$250	$0	$0	$0	$5,977
Plant bare root seedlings 17"-24"	$5,814	$0	$0	$0	$138,996
Construct levees					
Compaction	$0	$0	$37,500	$0	$0
Water truck	$0	$0	$390,000	$0	$0
Grade and subgrade	$0	$0	$770,000	$0	$0
Spread stockpiled prairie seedbank (on-site)					
Spread	$36,299	$36,299	$36,299	$36,299	$36,299
Grade	$21,296	$21,296	$21,296	$21,296	$21,296
Reseed open grassland	$702	$0	$0	$0	$0
Subtotal Costs	$1,878,049	$7,200,856	$8,398,356	$5,233,169	$5,389,757
Contingencies (12%)	$225,366	$864,103	$1,007,803	$627,980	$646,771
Engineering, Planning, and Design (10%)	$210,341	$806,496	$940,616	$586,115	$603,653
Construction management (7%)	$147,239	$564,547	$658,431	$410,280	$422,557
Total Costs	$2,460,995	$9,436,001	$11,005,205	$6,857,544	$7,062,738
Average Annual Costs	$175,510	$672,945	$784,856	$489,058	$503,692
Annual Agricultural Lease Income	$0	$11,011	$0	$20,251	$0
Net Annual Costs	**$175,510**	**$661,934**	**$784,856**	**$468,807**	**$503,692**

Sources: R.S. Means Building Construction Cost Data, 1999; G.E.C., Inc., 1999.

The average annual cost for Alternative 2a, Off-Site Disposal on State-Owned Land, Environmental Benefit Design, is $784,856. No agricultural lease income will be generated under this alternative.

The average annual cost for Alternative 3, Off-Site Disposal on Private Property, Contemporary Design, is $489,058. The average annual agricultural lease income was estimated at $20,251. This income estimate was based on existing agricultural lease payments received by the state for similar property amounting to $77 per acre per year, which was applied to 263 acres. Adjusting the average annual cost to account for the agricultural lease income results in a net average annual cost of $468,807 for this alternative.

The average annual cost for Alternative 3a, Off-Site Disposal on Private Property, Environmental Benefit Design, is $503,692. No agricultural lease income will be generated under this alternative.

3.4 Environmental Benefits

Under the no-action alternative, the proposed disposal area would not be disturbed in association with the proposed action. The wooded areas would continue to mature under normal succession. When the maturation of the existing site is compared to the on-site disposal alternative, environmental beneficial design, a net increase of 5.76 average annual habitat units (AAHUs) associated with the on-site disposal alternative would occur. The contemporary designs of alternatives 2 and 3 would not produce any net increase in environmental benefits; in fact, Alternative 2 would actually result in a decrease of duck use days (DUDs) compared to existing conditions. The environmental beneficial design of Alternative 2a is estimated to produce a net increase of 132,475 DUDs per year, while the environmental benefit design of Alternative 3a is estimated to produce 361.68 AAHUs.

3.5 Cost Effectiveness Analysis

As stated earlier, cost effectiveness analysis is intended to illustrate which alternatives can produce the same amount of environmental output for less costs or a larger quantity of output for the same or less cost. Table 3-7 presents the average annual cost and annual environmental outputs for each alternative. There is no cost associated with the no-action alternative, and the average annual net cost of the contemporary design of alternatives 2 and 3 are $661,934 and $468,807, respectively. These three alternatives do not produce any net increase in environmental benefits (the impact of the income generated by the agricultural enterprises associated with alternatives 2 and 3 are accounted for in the average annual costs). No-action is the least expensive alternative for producing no environmental output, therefore, it is the cost effective alternative for that level of output. In other words, the contemporary designs of alternative 2 and 3 are not cost effective from an environmental output standpoint. Alternative 1, and the environmental benefit design of alternatives 2a and 3a produce different quantities of environmental output at different annual costs and therefore are considered cost effective for their respective output level and cost. The cost-effective alternatives (no-action and alternatives 1, 2a, and 3a) are presented in bold type in Table 3-7.

3.6 Incremental Cost Analysis

Incremental cost analysis illustrates the increase in costs associated with advancing from one output level to the next higher output level. Table 3-8 presents the net average annual cost, the annual environmental output, the average cost of output, the incremental output, and the total and per unit incremental cost of the cost-effective alternatives.

The average cost per AAHUs for Alternative 1 is $30,471, which is also the incremental cost per unit. The total annual incremental cost, the increase in costs from no-action is $175,510. Alternative 3a produces 361.68 AAHUs, at an annual average cost of $503,692, resulting in an average cost of $1,393 per AAHUs. When compared to Alternative 1, the annual incremental cost of this alternative is $328,181, and the incremental output is 355.92 AAHUs, yielding a per unit incremental cost of $922.

Table 3-7. J. T. Myers Lock and Dam, Site Specific Environmental Impact Assessment Cost Effectiveness Analysis

Alternatives	Net Annual Costs	Net Environmental Outputs
No-Action	**0**	**0**
1, On-Site Disposal	**$175,510**	**5.76 AAHUs**
2, Off-Site/State-Owned, Contemporary	$661,934	0
2a, Off-Site/State-Owned, Env. Benefit	**$784,856**	**132,475 DUDs**
3, Off-Site/Private-Owned, Contemporary	$468,807	0
3a, Off-Site/Private-Owned, Env. Benefit	**$503,692**	**361.68 AAHUs**

Note: AAHUs = Average Annual Habitat Units
DUDs = Duck Use Days

Source: G.E.C., Inc.

Table 3-8. J. T. Myers Lock and Dam, Site Specific Environmental Impact Assessment, Incremental Cost Analysis of Increasing Output from the No-Action Alternative

Alternatives	Net Annual Costs	Net Environmental Outputs	Average Cost Per Output	Incremental Outputs	Incremental Cost Total	Incremental Cost Per Unit
No-Action	0	0	Not Applicable	0	Not Applicable	Not Applicable
1, On-Site Disposal	$175,510	5.76 AAHUs	$30,471	5.76 AAHUs	$175,510	$30,471
3a, Off-Site/Private-Owned, Env. Benefit	$503,692	361.68 AAHUs	$1,393	355.92 AAHUs	$328,181	$922
2a, Off-Site/State-Owned, Env. Benefit	$784,856	132,475 DUDs	$6	132,475 DUDs	$784,856	$6 *

Note: AAHUs = Average Annual Habitat Units
DUDs= Duck Use Days

*The output of Alternative 2a is measured in different units than alternatives 1 and 3a; therefore, the incremental costs and output for Alternative 2a are based on the increase from the no-action alternative.

Source: G.E.C., Inc.

The environmental output of Alternative 2a is measured in DUDs; therefore the incremental output and costs cannot be compared to alternatives 1 and 3a, whose environmental output is measured in AAHUs. For this reason, the incremental cost analysis for Alternative 2a is based on a comparison to no-action. When compared to no-action, the average annual and incremental cost of Alternative 2a is $779,664 and the average annual and incremental environmental output is 132,475 DUDs. This results in an average and incremental per unit cost of $6 per DUDs.

4.0 ENVIRONMENTAL IMPACT ASSESSMENT

4.1 Baseline Conditions

4.1.1 Alternative 1. On-Site Disposal (Preferred Alternative). In 1998, G.E.C., (Gulf Engineers & Consultants), Inc. conducted a terrestrial habitat survey over a portion of the site adjacent to the J.T. Myers Locks and Dam [approximately 400+ acres (Figure 9)]. A copy of this report is included in Appendix B. Using real-time global positioning systems (GPS), aerial photography, and ground sample points along transects, cover types were mapped as they existed in 1998. A report containing the results of the investigation was generated titled *Terrestrial Cover Types at J.T. Myers Locks and Dam, A First Look*. The following subsections provide a summary of the information contained therein.

4.1.1.1 <u>Maple/Elm/Ash Forests</u>. The western portion of the study area contains a mixture of forested wetland and non-wetland which transitions from the maintained land around the locks and dam north to Little Pitcher Lake. This area is dominated by maples (*Acer* sp.), American elm (*Ulmus americiana*), and green ash (*Fraxinus pennsylvanica*) with a high overstory of eastern cottonwood (*Populus deltoides*) in many areas. A combination of water regime and historic land use have influenced the species composition of this area. Forest stands range from pure maple to others with primarily American elm and green ash with various mixes throughout. Four types of maple/elm/ash forest were identified and are described below.

- <u>Red Maple Forest</u>. Small stands of pure, dense and young red maple (*Acer rubrum*) dominate this community. The understory component is generally absent due to frequency and duration of flooding and shade resulting from the closed canopy.

- <u>Maple/Cottonwood Flats</u>. Large, frequently flooded flatwoods comprised of older maples and eastern cottonwood dominating the overstory are found to the western side of the study area. A combination of prolonged inundation and a closed canopy have precluded the establishment of a dominant mid and understory. In disturbed areas, where large trees have been downed, small thickets of vines and saplings of green ash and American elm are present.

- <u>Maple/Cottonwood Ridge and Swale Complex</u>. The least homogeneous type is defined by a large ridge and swale complex. This community is a mixture of inundated to periodically flooded sites separated by a series of low ridges, some of which appear to be manmade. The forest cover of this area is primarily comprised of maples, hackberry (*Celtis laevigata*), and green ash in the swales and eastern cottonwood and some hickories (*Carya* sp.) on the ridges. Those areas with prolonged inundation are dominated with buttonbush (*Cephalanthus occidentalis*) and black willow (*Salix nigra*), and upslope they transition into green ash and hackberry.

- <u>Maple/Ash/Elm Forest</u>. South of the maple/cottonwood flats and ridge and swale complex, the frequency and duration of flooding decreases resulting in forests with slightly different species composition. These areas have closed canopies of mixed species including maple, green ash and American elm with a varying eastern cottonwood component. Due to the lower frequency and/or duration of flooding, the under and mid-story density increases in some areas. In places with a higher density of maples, the understory is more open, and as the composition shifts to more American elm and ash, the mid and understory becomes thicker with some hackberry and boxelder (*Acer negundo*) present.

4.1.1.2 Stream/Lake/Ditch-Side Forest. The majority of the site is flooded in varying degrees at different times of the year. Depending on the duration of flooding and the slope of the land, the composition of these forested areas adjacent to streams and ditches can vary greatly. Three types of forests found along the margins of Little Pitcher Lake and natural streams and drainages are described below.

- Mature Forest. Three areas on-site are defined by larger trees along streams or natural drainages with adjacent sloping land. These areas contain more mature trees relative to surrounding land with very little under and mid-story due to inundation and the dense canopy. Patches of switchcane (*Arundinaria gigantea*) and herbaceous growth are found along some of the side slopes of the streams and drains. The older trees in the drains include large maples, green ash, hackberry, and American sycamore (*Platanus occidentalis*), and older trees above the normal channel include hickories, maples and honeylocust (*Gleditsia tricanthos*). The remaining mature forested areas adjacent to and above the stream bank which flood less have a mid- and understory of greenbrier (*Smilax* sp.), large muscadine (*Vitis rotundifolia*) vines, pawpaw (*Asimina triloba*), and hawthorn (*Cretagus* sp.) indicating a more mature forest composition.

- Invader Forest. Very wet areas that have been disturbed in association with ditch construction or maintenance are forested by young black willow, eastern cottonwood and American sycamore. These areas are often flooded throughout the year and will eventually be taken over by other bottomland species as the invader species die out through succession.

- Willow/Buttonbush Swamp. In areas that are permanently or semi-permanently inundated, black willow and buttonbush predominate. These areas are usually bordered by green ash and maples either on ridges or through a gradual rise in elevation. The overstory of many of these areas have some older eastern cottonwood. South of Little Pitcher Lake, it appears that an overstory of eastern cottonwood and maples has died off in the last few years, possibly due to an increased hydroperiod, as a result of a higher water level being maintained in the lake.

4.1.1.3 Well-Drained Forests. Areas of the site which do not receive flooding as regularly or for shorter duration have species compositions which are more varied than the flooded maple forests and in some areas resemble upland forests. Although these areas have been designated as well drained, some of these areas are within wetlands delineated on the site. Three of these areas have been identified and are described below.

- Mixed Hardwoods. The portion of the site area east of the locks and dam access road is drier than the areas to the west. This area drained by a ditch to the west and a natural drainage into the ditch. The area has a higher proportion of hard mast producers and other wildlife species such as oaks (*Quercus* sp.), persimmon (*Diospyros virginiana*), hickories, black walnut (*Juglans nigra*), and honeylocust. Large, mature trees border the

Corps land to the east indicating the past cover type and the seed source for the present stand composition.

- Young Hardwood Forest/Scrub. These areas, which are adjacent to the mixed hardwoods, have the same basic species composition, but are noticeably younger than the adjacent mixed hardwoods. These areas, due to their age, are less dense than the adjacent forest and therefore the canopy is open in many areas allowing a thick understory of sumac (*Rhus* sp.), leadplant and various vines and herbaceous plants to grow. Other areas have a very tight spacing of young hardwoods yielding a thick stand of sapling to pole-sized trees.

- Sloping Woods. On the northern portion of the site, there is a forest stand found on slopes between upland areas and the wooded swamps and drainages. This area has been delineated due to its differing species composition from other forested areas on-site. Although some large eastern cottonwoods are dominate in the canopy, the majority of the species filling in the canopy are younger sweetgum (*Liquidambar styraciflua*), boxelder, redbud (*Cercis canadensis*), and black cherry (*Prunus serotina*).

4.1.1.4 Open Areas. Around the locks and dam complex there are clearings maintained by periodic mowing. Adjacent to these maintained clearings and within the maple/elm/ash forests are some open areas with different cover types.

- Prairie Restoration. This area was established by the USACE in partnership with the Indiana Department of Natural Resources as a restoration project under Section 1135 of the Water Resources Development Act of 1986. It is made up of a mixture of native prairie grasses and range plants. It is easily recognized by the presence of little and big bluestem as well as other annuals and perennials.

- Young Hardwood Plantations. some open areas have been planted with a mixture of native hardwoods such as oaks, hickories, dogwood (*Cornus florida*), and green ash. These openings are covered in annuals and perennials, and the planted trees are evident primarily along the edges.

- Herbaceous/Vine Covered. Some larger openings within the maple cover types were delineated due to their size. These were created by some disturbance as evident by the stumps, and downed debris from trees. The openings are covered in vines such as morning glory or thick patches of great ragweed (*Ambrosia trifida*), or cocklebur. Some of these areas may have been planted in mixed hardwoods; however, either due to their small size or poor survival, the young trees were not evident at the time of the survey.

- Ash/Maple Scrub. Wetter openings within the ridge/swale complex consist of sapling-sized green ash and maples in thickets of various annuals, perennials and vines. In areas where the saplings are larger, the understory density decreases due to the canopy closure.

- Ash/Hackberry Scrub. Slightly drier openings along the maintained clearing and prairie areas are comprised of American elm, hackberry and green ash saplings with a dense understory of leadplant, poison ivy (*Toxicodendron radicans*), and various perennials and annuals. It appears that these areas may have been cleared for agricultural use prior to Corps ownership.

A wetland delineation was conducted in March 1999. The preliminary results of the survey identified approximately 120 acres of wetlands and 13 acres of other waters (a man-made pond and Little Pitcher Lake) (Figure 10). The wetlands are located towards the central portion of the site and outside of the proposed disposal areas.

4.1.2 Alternative 2. Off-Site Disposal On State Owned Lands. The site is an approximate 143 acre tract owned and managed by the Indiana Department of Natural Resources that is planted in crops under an agriculture outlease program (Figure 11). Crops include a rotation of yellow corn and soybeans. The tract is nearly level and is inundated on portions during seasonal high water events.

Personal communication with the Hovey Lake Manager indicated that this area is considered Farmed Wetlands as opposed to Prior Converted Farmland. Therefore any land use change that would require the deposition of dredged and fill material could result in a reclassification of the status.

4.1.3 Alternative 3. Off-Site Disposal On Private Property. This parcel includes approximately 467 acres and is a mixture of open agriculture land and bottomland hardwoods (Figure 11). Rights-of-Entry for this property were not available and therefore a detailed study of species composition and land use cover types, similar to that conducted on the site adjacent to J.T. Myers was not conducted. Species composition and land use cover types for this site were generated from on-site observations of adjacent property, and review of U.S. Geological Survey (USGS) topographic quadrangle maps and County Soil Survey maps. Based on crop data for areas in the vicinity of this site, the agriculture land is probably a mixture of corn and soybeans on a rotational basis. Wooded areas include as dominants shagbark hickory (*Carya ovata*), hackberry, honey locust, black locust, white oak (*Quercus alba*), and northern red-oak (*Quercus rubra*) in the overstory, with box elder, hackberry, hawthorn, poison ivy, and Virginia creeper (*Parthenocissus quinquefolia*) comprising the mid story. Various grasses and sedges were present in the understory. The hydroperiod appears to be seasonally flooded to periodically inundated with low semi-permanently flooded areas scattered throughout the wooded portions of the site.

4.2 Impact Assessment

4.2.1 Wetlands. The following describes the potential wetland impacts associated with utilization of each alternative disposal site. A jurisdictional wetland determination was performed on the proposed on-site disposal area only. The expected impacts for the off-site disposal sites may require further investigation prior to project implementation.

4.2.1.1 Alternative 1, On-Site Disposal (Preferred Alternative). Based on the findings of a wetland delineation performed in May 1999, approximately 120 acres of the property are considered wetlands, and approximately 13 acres contain open water. The 13 acres of open water include Little Pitcher Lake and a small man-made pond located in the southwestern portion of the site. The wetlands were generally confined to the north central portion of the site. The wetland boundary is located in a broad transition zone. The current boundary generally follows the 347-foot contour with some variation towards the center of the property. No wetlands are located in the area proposed for disposal of dredge material, and therefore, no impacts to wetlands are expected under this alternative.

4.2.1.2 Alternative 2, Off-Site Disposal On State Owned Lands. Personal communication with the Hovey Lake Manager indicated that the 143 acres included in this alternative are classified as Farmed Wetlands. This means that the hydrology has not been sufficiently altered such that if agriculture operations were suspended, the area would naturally regenerate in hydrophytic vegetation and would be classified as wetlands. Under the contemporary design, the elevation would be raised approximately two feet. It is assumed that the increase in elevation would void the wetland designation as the area hydroperiod would be significantly altered. Further, coordination with the USACE and other Federal and State agencies would be required to determine if mitigation would be required.

Under the beneficial design, the area would be inundated for extended periods annually through the creation of moist soil units and allowed to revegetate naturally. Therefore, it is likely that the wetland status would remain and no adverse impacts to wetlands would occur.

4.2.1.3 Alternative 3, Off-Site Disposal On Private Property. Access to this proposed alternative disposal site was not granted; therefore, a wetland delineation was not performed. However, based on a site reconnaissance of adjacent agriculture land at the same or slightly lower elevation, it appears that this site would have a designation of non-wetland or Prior Converted Farmland. The site elevation, and general species composition is comparable to areas designated as non-wetland on the site adjacent to J.T. Myers. Based on this information, no impacts to wetlands under either alternative disposal design are expected under this alternative. However, prior to the deposition of any dredge or fill material on this site associated with this action, a jurisdictional wetland determination should be performed.

4.2.1.4 No-Action. Under the no action alternative, no impacts to wetlands are expected.

4.2.2 Wildlife Habitat. In order to quantify the impacts to wildlife habitat associated with the implementation of the proposed action, a habitat analysis for each of the proposed alternatives using either the Habitat Evaluation Procedures (HEP) or the Waterfowl Assessment Methodology was conducted. The findings of the habitat evaluation allow the comparison of the impacts between the no action and each of the disposal design alternatives to determine the most beneficial alternative in regards to wildlife habitat. The following paragraphs describe the impacts associated with each of the alternatives and disposal design alternatives.

A report presenting the results of the habitat evaluation is provided in Appendix C.

4.2.2.1 Alternative 1, On-Site Disposal (Preferred Alternative). Under this alternative six evaluation species were used to evaluate the impacts to terrestrial habitat on the proposed site. These species are as follows: wood duck, gray squirrel, mink, yellow warbler, swamp rabbit, and eastern wild turkey.

The evaluation included habitat throughout the entire J. T. Myers Locks and Dam property. It was concluded that the proposed disposal of dredged material in the designated sites would impact habitats that are utilized by the yellow warbler, eastern wild turkey, and the gray squirrel. If no action was taken on the proposed site, the site would provide approximately 677.03 average annual habitat units (AAHUs); whereas the disposal of the dredge material and replanting of the disposal sites would provide a total of 682.79 AAHUs. This equates to a 5.76 gain in AAHUs with the disposal of the dredge material and replanting of the disposal sites. The gain in AAHUs of 5.76 are primarily related to the replanting of the current scrub shrub area (11 acres) in bottomland hardwoods using the species composition outlined in Section 2.1.1.1.

4.2.2.2 Alternative 2, Off-Site Disposal On State Owned Lands. For Alternative 2, the Waterfowl Assessment Methodology was used to evaluate the habitat changes at the proposed site with the implementation of the various alternative designs. This methodology was developed to determine the wintering waterfowl carrying capacity of a site according to the land use, hydrology and food availability during the 120-day wintering period for waterfowl (November 1 to February 28). This carrying capacity is expressed in duck-use-days (DUDs) which represents the capacity of the available forage to meet the energy requirements of one duck for one day per acre. The existing conditions of the proposed site provide approximately 90,948 DUDs during a wintering period. If the Contemporary Design is utililzed the DUDs will decrease to 45,474 DUDs during a wintering period. Under the Environmental Restoration design the site will be managed as a moist soil waterfowl management area which will provide 223,423 DUDs during a wintering period.

4.2.2.3 Alternative 3, Off-Site Disposal On Private Property. The disposal site for Alternative 3 was comprised of approximately 263 acres of privately owned farmland surrounded by bottomland hardwood forests. Because the proposed site is farmland proposed to be restored to bottomland hardwood forest, the gray squirrel, barred owl, and downy woodpecker were used as the evaluation species. Under the existing conditions and the contemporary design alternative, the site provides little habitat for the evaluation species. With the implementation of the environmental beneficial design alternative, which calls for restoring the site to bottomland hardwood forest after the material is deposited on the site, there would be approximately 361.68 AAHUs provided during the 50-year project life.

4.2.3 Threatened and Endangered Species. A Biological Assessment of the Indiana bat (*Myotis sodalis*), bald eagle (*Haliaeetus leucocephalus*), and the fat pocketbook mussel (*Potamilus capax)* was prepared in accordance with the guidelines in Section 7 of the Endangered Species Act of 1973, as amended. A copy of the report is included as Appendix D, with the following subsections including the summarized results of the assessment

4.2.3.1 Alternative 1, On-Site Disposal (Preferred Alternative). On-site disposal would require the temporary loss of approximately 20.4 acres of prairie, 69 acres of frequently maintained open grassland, and approximately 11 acres of scrub shrub habitat. Both of these communities are adjacent or near the water, and may be used in the spring and summer as foraging habitat. It is not likely that the entire open area would be impacted simultaneously, and sufficient foraging habitat would remain during the project construction. As these areas would be restored to pre-project conditions upon completion of the project, no adverse affects to the Indiana bat or habitat are expected.

The proposed project would also require an approximately 100-foot-wide area landward from the Ohio River along the right descending bank downstream from the existing 600-foot lock chamber approximately 2100 feet (50 feet wide in the first and last 300 feet) to be removed to improve lower approach barge alignment with the new lock extension. Currently this area is dominated by black willow (*Salix nigra*) along the first shelf of the riverbank, transitioning to a silver maple (*Acer saccharinum*) stand. The majority of the potential Indiana Bat roost trees are present landward of the river, especially in the vicinity of Little Pitcher Lake. The clearing associated with this phase of the project is considered minor, and if it is performed outside of the summer occupancy period

(April 15–September 15), there would likely be no adverse affects to the Indiana bat, or its preferred habitat.
The area targeted for on-site disposal of dredge material associated with the proposed project does not contain bald eagle nesting or roosting habitat and therefore bald eagles would not be affected.

No fat pocketbook mussel habitat exists at this proposed disposal site. Therefore, the proposed disposal of dredge material would not affect the fat pocketbook mussel.

A mussel survey was conducted to determine the presence or absence of the fat pocketbook mussel. No fat pocketbook mussels were observed in the vicinity of the proposed project. Suitable habitat was recorded downstream of the locks and dams and outside of the proposed dredging area. Construction of the proposed project is not likely to adversely affect fat pocketbook mussel habitat. Construction of the proposed project would have no affect on the fat pocketbook mussel.

4.2.3.2 Alternative 2, Off-Site Disposal On State Owned Lands. This area is currently maintained for crop production and may be used for foraging by the Indiana bat in the spring and summer. Under the contemporary design and the beneficial use of the dredge material design, the area would remain open and could continue to be used for foraging. Disposal of dredge material, under this alternative, would not likely effect the Indiana bat or its preferred habitat.

The proposed site is adjacent to the Hovey Lake Wildlife Management Area and is currently being used for crop production. One bald eagle nest is approximately 0.8 miles from the proposed site. The contemporary disposal design and beneficial use of the dredge material would not alter any bald eagle nesting or roosting habitat, and therefore would not affect bald eagles or their preferred habitat.

No fat pocketbook mussel habitat exists at this proposed disposal site. Therefore, the proposed disposal of dredge material (contemporary or beneficial use design) would have no affect on the fat pocketbook mussel.

4.2.3.3 Alternative 3, Off-Site Disposal On Private Property. The area targeted for disposal is currently used for crop production. It is openland and surrounded by mature bottomland hardwoods, which contain potential Indiana bat summer nesting and roosting habitat. The proposed disposal area may be used for foraging by Indiana bats during the spring and summer. Under the contemporary design, the area would remain croplands and could continue to be used for foraging. Therefore, under this scenario, no affects to the Indian bat are expected.

Under the beneficial use of the dredge material design, the area would be replanted in bottomland hardwoods thereby reducing forest fragmentation in the area (a suspected cause of Indiana bat population decline) and provide future summer nesting and roosting habitat for the Indiana bat. There is sufficient open agriculture land in the area to offset any foraging habitat loss associated with connecting the land from open agriculture land to bottomland hardwoods. This scenario is expected to have a beneficial affect on the Indiana bat.

One bald eagle nest is approximately two miles from the proposed site. The contemporary disposal design and beneficial use design would not alter any bald eagle nesting or roosting habitat, and therefore would not affect bald eagles or their preferred habitat.

No fat pocketbook mussel habitat exists at this proposed disposal site. Therefore, the proposed disposal of dredge material (contemporary or beneficial use design) would have no affect the fat pocketbook mussel.

4.2.3.4 No-Action. Under the no-action alternative no adverse impacts to the Indiana bat, bald eagle or the fat pocketbook mussel or their preferred habitat would likely occur. The area currently designated scrub shrub (11 acres) would continue to mature under the no-action alternative. As these trees mature they could provide additional summer roosting habitat for the Indiana bat resulting in a potential beneficial affect on this species.

5.0 SUMMARY AND CONCLUSION

The Environmental Impact Assessment (EIA) evaluated the impacts associated with the disposal of approximately 500,000 cubic yards of dredge material (clay, sand, and silt) in conjunction with the proposed improvements to the J.T. Myers Locks and Dam. The EIA also considered the impacts associated with the lower approach improvements to the right descending bank, which included removal of an approximately 2,100-foot-long by 100-foot-wide (50 feet wide along the first and last 300 feet) section of the bank below the locks and dam. Impacts to wetlands, biological resources, and threatened and endangered species (specifically, the bald eagle, fat pocketbook mussel, and the Indiana bat) were considered. A cost-benefit analysis was also conducted for all disposal alternatives and alternative designs considered.

Four disposal alternatives are being considered, including the No-Action Alternative: (1) On-Site Disposal (Preferred Alternative); (2) Off-Site Disposal on State Owned Lands; (3) Off-Site Disposal on Private Property and (4) No-Action. Within each of the three action alternatives, two alternate disposal plans exist: contemporary (spread out material to the extent possible without impacting wetlands or heavily wooded areas), and beneficial use for environmental enhancement/restoration. The USACE owns the entire site included in Alternative 1. However, the areas included in alternatives 2 and 3 are owned by the State of Indiana and private interests, respectively. A cost-benefit analysis was also conducted for all disposal alternatives and alternative designs considered.

The following subsections provide a summary of impacts, as well as the cost effectiveness analysis.

5.1 Wetlands

Disposal of dredge material under alternatives 1 and 3 would not impact jurisdictional wetlands. Personal communication with the Hovey Lake Manager indicated that the area included in Alternative 2 (off-site, State owned lands) are classified as Farmed Wetlands. Under the contemporary design, the elevation would be raised approximately two feet, and it is probable that this increase in elevation would void the wetland designation because the area hydroperiod would be significantly altered. Under the beneficial use design the area would be maintained as a moist soil unit and may still be classified as wetlands. Coordination with the USACE and other Federal and State agencies would be required prior to implementation of the contemporary design for Alternative 2 to determine if mitigation would be required.

5.2 Biological Resources

The HEP analysis presented the impacts to wildlife habitat for alternatives 1 and 3 as a net change in AAHUs between the No-Action and either a contemporary or a beneficial use for environmental enhancement/restoration. Under Alternative 1, it was determined that the contemporary design would result in a net increase of 5.76 AAHUs over the AAHUs provided by the No-Action. There was not a beneficial use for environmental enhancement/restoration design evaluated for this alternative because early coordination with IDNR and the USACE showed this not to be a feasible alternative design (the impacts associated with the implementation would have outweighed the benefits gained).

Alternative 2 was evaluated using the Waterfowl Assessment Methodology. This evaluation expresses habitat quality as duck-use-days (DUDs) per waterfowl wintering period (120 days between November 1 and February 28). Currently the site provides 90,948 DUDs per waterfowl wintering period. With the implementation of the contemporary design, the site would provide only 45,474 DUDs per wintering period, a 50 percent decrease in available waterfowl foraging habitat. Under the beneficial use for environmental enhancement/restoration design, the site would provide approximately 223,423 DUDs per wintering period, which would be a 245 percent increase over the No-Action Alternative.

The proposed site for Alternative 3 currently is composed of agricultural fields that provide little habitat for the evaluation species analyzed in the HEP analysis (gray squirrel, downy woodpecker, and the barred owl). Under the contemporary design the disposal material would be placed on the site and agricultural practices would continue. Therefore, this disposal design alternative could have beneficial or adverse impacts on wildlife habitat according to the evaluation species analyzed. Under the beneficial use for environmental enhancement/restoration design the disposal material would be placed on the site, and the site would be planted with indigenous bottomland hardwood species. This design alternative would result in a 361.68 AAHU increase over the No-Action Alternative.

5.3 Threatened and Endangered Species

There are no known Indiana bat populations or bald eagle nests located on any of the proposed disposal sites, however potential habitats for the bald eagle and Indiana bat are present on the site adjacent to the locks and dam, particularly around Little Pitcher Lake. Little Pitcher Lake is located north of any proposed on-site disposal areas (Alternative 1).

Alternatives 2 and 3 (proposed off-site disposal areas) contain open grassland that may possibly be used for foraging in the spring and summer by Indiana bats. Under the contemporary disposal design these areas would remain open and could continue to be used for foraging. Under the beneficial use design, Alternative 2 would be restored to a bottomland hardwood community and could provide future roosting and nesting habitat for the Indiana bat. On-site disposal would not likely affect the bald eagle, or the fat pocketbook mussel.

Assuming that any land clearing in wooded areas would be performed outside of the summer occupancy period (April 15–September 15), there would likely be no adverse affects to the Indiana bat or its preferred habitat under alternatives 1, 2 or 3. Further, beneficial effects for the Indiana bat could occur under the beneficial use for environmental enhancement/restoration design for Alternative 3. Implementation of alternatives 2 and 3 would likely have no adverse affect on the bald eagle or the fat pocketbook mussel.

Construction would include dredging approximately 500,000 cubic yards of material from the Ohio River, and removing an approximately 2,100-foot-long by 100-foot-wide (with the exception of the first and last 300, feet which would be 50 feet wide) section of the right descending bank below the J.T. Myers Locks and Dam for lower approach improvements. A mussel survey was conducted to determine the presence or absence of the fat pocketbook mussel. No fat pocketbook mussels were observed in the vicinity of the proposed project. Suitable habitat was recorded downstream of the locks and dams and outside of the proposed dredging area. Construction of the proposed project is not likely to adversely affect fat pocketbook mussel habitat. Construction of the proposed project would have no affect on the fat pocketbook mussel. No preferred Indiana bat habitat would be adversely affected during this phase of the project, assuming that any land clearing in wooded areas would be performed outside of the summer occupancy period (April 15–September 15. Some potential bald eagle foraging habitat may be affected (increased sedimentation during construction, and alteration of the riparian habitat associated with the lower approach improvements) during the construction phase of the proposed project. However, these impacts would be temporary and are not considered significant because sufficient foraging habitat exists adjacent to the proposed construction areas.

5.4 Cost Effectiveness and Incremental Cost Analysis

Cost effectiveness and incremental cost analysis was conducted for the five disposal alternatives in order to supply decision-makers with pertinent information for choosing the alternative that best satisfies project objectives. Cost effectiveness analysis compares alternative plans that produce environmental outputs and determines which plan can produce the largest quantity of output for a given cost, or produce the same or greater quantity of output for less cost. Incremental cost analysis compares the increase in costs (of cost effective alternatives) of advancing from one output level to the next higher level of output, to the increase in outputs.

Cost estimates were developed for each disposal alternative, and average annual cost, based on a 50-year project life and 6.875 percent federal discount rate, was calculated. The contemporary designs of alternatives 2 and 3 did not produce a net increase in environmental outputs. These two alternatives were not cost effective from the environmental output standpoint. The environmental output of Alternative 1 and of the environmental benefit design of Alternative 3a were measured in AAHUs. Alternative 1 had a total annual and incremental cost of $175,510 and produced total annual and incremental output of 5.76 AAHUs, yielding an average annual and incremental cost per AAHUs of $30,471. Alternative 3a had annual costs of $503,692 and incremental costs of $328,181. Annual environmental outputs of this alternative were 361.68 AAHUs and the incremental output was 355.92 AAHUs. Average cost per AAHUs was $1,393 and incremental cost per AAHUs was $922.

The environmental output of Alternative 2a is measured in DUDs, therefore the incremental output costs cannot be compared to alternatives 1 and 3a, whose environmental output is measured in AAHUs. For this reason, the incremental cost analysis for Alternative 2a is based on a comparison to no-action. When compared to No-Action, the average annual and incremental cost of Alternative 2a is $784,856 and the average annual and incremental environmental output is 132,475 DUDs. This results in an average and incremental per unit cost of $6 per DUD.

Under the No-Action Alternative, no construction and dredging would occur associated with lock expansion activities. Therefore, no adverse impacts to wetlands, terrestrial habitat, or threatened and endangered species would likely occur.

6.0 FIGURES

This section includes all figures referenced throughout the text. These figures are numbered to correspond with the appropriate text references.

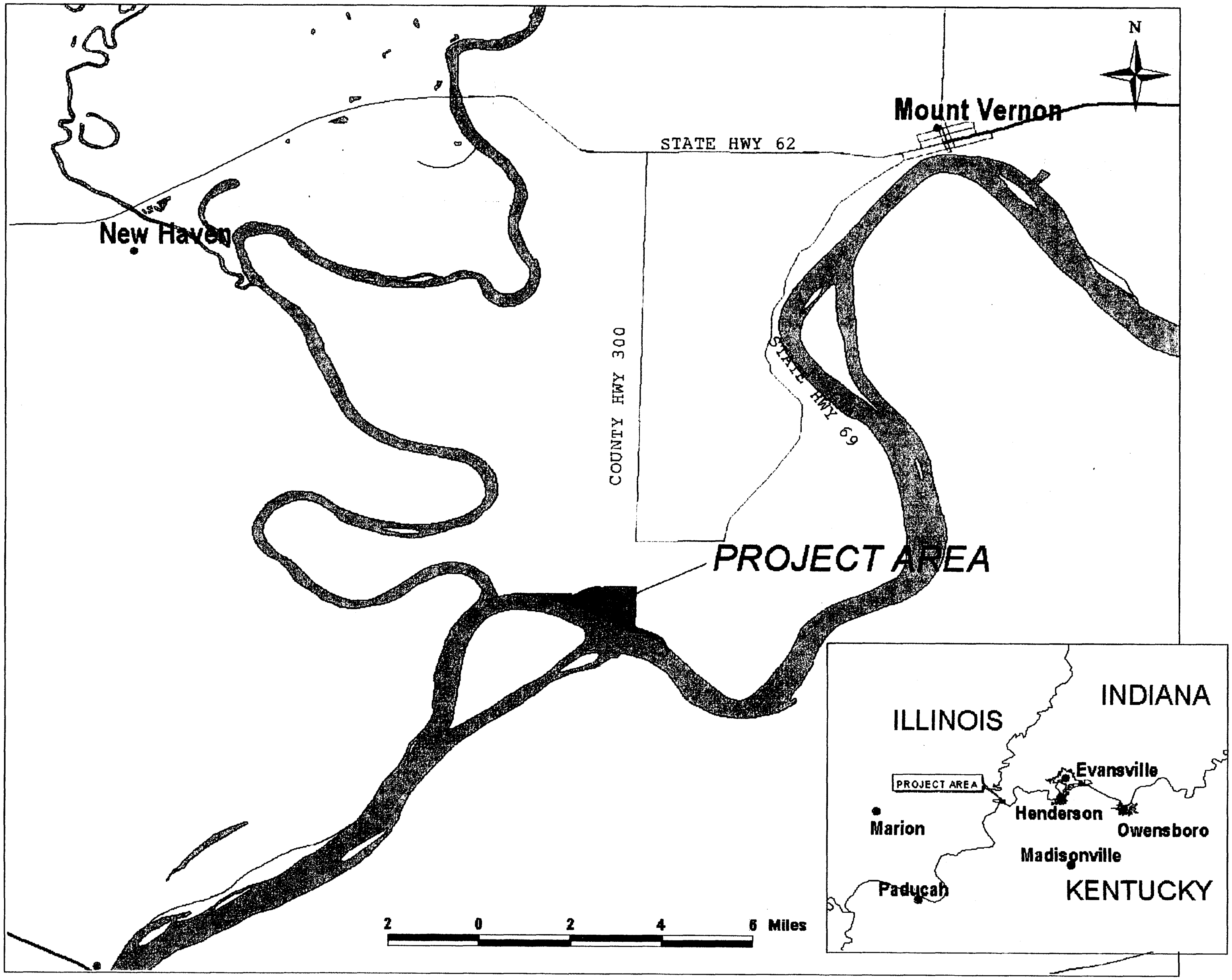
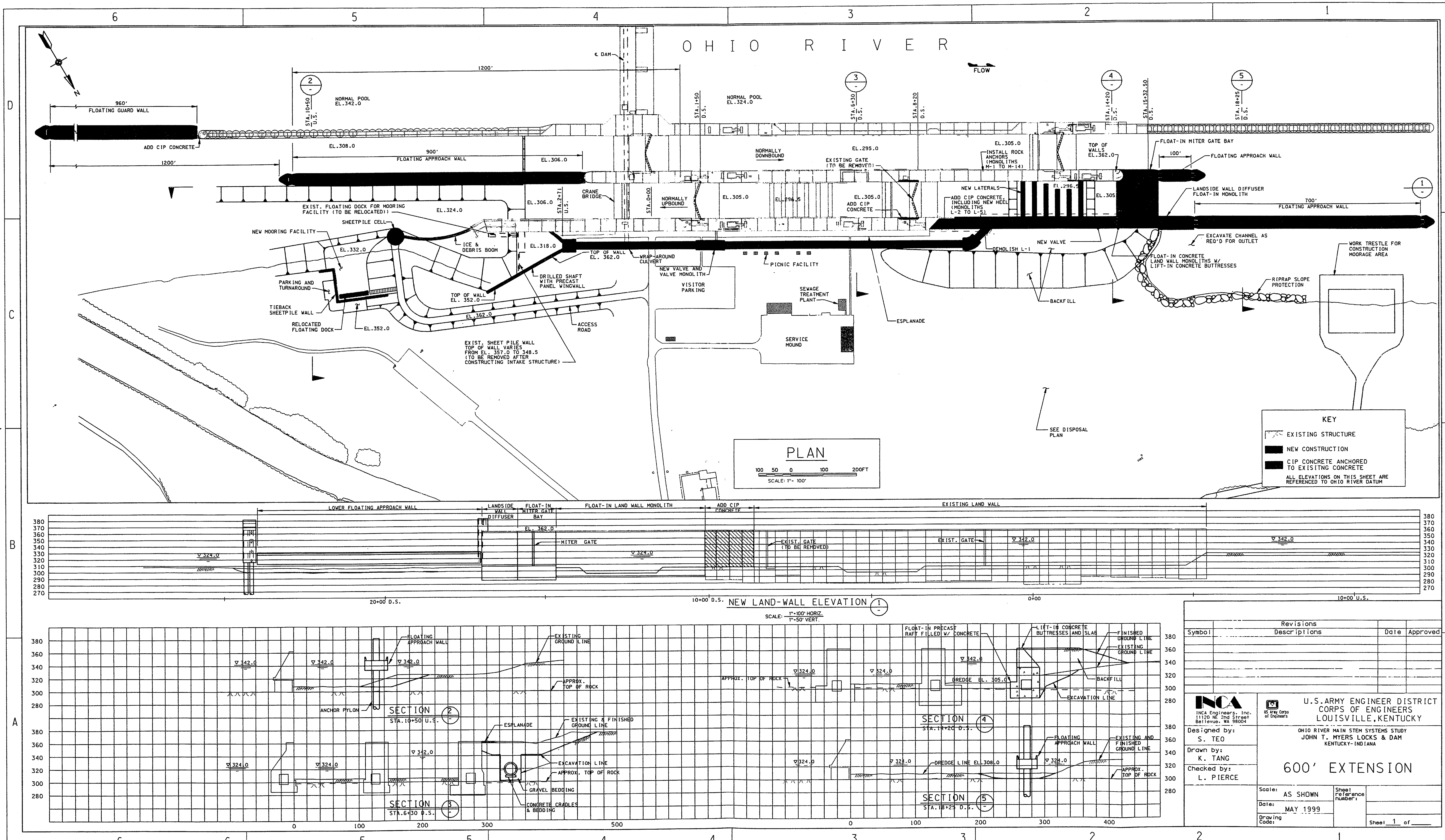


Figure 1. Location of J.T. Myers Locks and Dam


OHIO RIVER
FLOW
PLAN
SCALE: 1"= 100'
KEY
EXISTING STRUCTURE
NEW CONSTRUCTION
CIP CONCRETE ANCHORED TO EXISITNG CONCRETE
ALL ELEVATIONS ON THIS SHEET ARE REFERENCED TO OHIO RIVER DATUM
960' FLOATING GUARD WALL
900' FLOATING APPROACH WALL
700' FLOATING APPROACH WALL
ADD CIP CONCRETE
NORMAL POOL EL.342.0
NORMAL POOL EL.324.0
NORMALLY DOWNBOUND
NORMALLY UPBOUND
CRANE BRIDGE
EXISTING GATE (TO BE REMOVED)
FLOAT-IN MITER GATE BAY
LANDSIDE WALL DIFFUSER FLOAT-IN MONOLITH
EXCAVATE CHANNEL AS REQ'D FOR OUTLET
WORK TRESTLE FOR CONSTRUCTION MOORAGE AREA
RIPRAP SLOPE PROTECTION
FLOAT-IN CONCRETE LAND WALL MONOLITHS W/ LIFT-IN CONCRETE BUTTRESSES
NEW LATERALS
ADD CIP CONCRETE, INCLUDING NEW HEEL (MONOLITHS L-2 TO L-5)
INSTALL ROCK ANCHORS (MONOLITHS M-1 TO M-14)
NEW VALVE
DEMOLISH L-1
BACKFILL
ESPLANADE
SEE DISPOSAL PLAN
PICNIC FACILITY
SEWAGE TREATMENT PLANT
SERVICE MOUND
VISITOR PARKING
NEW VALVE AND VALVE MONOLITH
WRAP-AROUND CULVERT
DRILLED SHAFT WITH PRECAST PANEL WINGWALL
ACCESS ROAD
EXIST. SHEET PILE WALL TOP OF WALL VARIES FROM EL. 357.0 TO 348.5 (TO BE REMOVED AFTER CONSTRUCTING INTAKE STRUCTURE)
EXIST. FLOATING DOCK FOR MOORING FACILITY (TO BE RELOCATED)
SHEETPILE CELL
ICE & DEBRIS BOOM
NEW MOORING FACILITY
PARKING AND TURNAROUND
TIEBACK SHEETPILE WALL
RELOCATED FLOATING DOCK
NEW LAND-WALL ELEVATION
SCALE: 1"=100' HORIZ. 1"=50' VERT.
LOWER FLOATING APPROACH WALL
LANDSIDE WALL DIFFUSER
FLOAT-IN MITER GATE BAY
FLOAT-IN LAND WALL MONOLITH
ADD CIP CONCRETE
EXISTING LAND WALL
MITER GATE
EXIST. GATE (TO BE REMOVED)
SECTION 2 STA.10+50 U.S.
SECTION 3 STA.6+30 D.S.
SECTION 4 STA.14+20 D.S.
SECTION 5 STA.18+25 D.S.
FLOATING APPROACH WALL
EXISTING GROUND LINE
APPROX. TOP OF ROCK
ANCHOR PYLON
ESPLANADE
EXISTING & FINISHED GROUND LINE
EXCAVATION LINE
GRAVEL BEDDING
CONCRETE CRADLES & BEDDING
FLOAT-IN PRECAST RAFT FILLED W/ CONCRETE
LIFT-IN CONCRETE BUTTRESSES AND SLAB
FINISHED GROUND LINE
DREDGE LINE EL.308.0
Revisions
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U.S.ARMY ENGINEER DISTRICT CORPS OF ENGINEERS LOUISVILLE,KENTUCKY
OHIO RIVER MAIN STEM SYSTEMS STUDY
JOHN T. MYERS LOCKS & DAM
KENTUCKY-INDIANA
Designed by: S. TEO
Drawn by: K. TANG
Checked by: L. PIERCE
600' EXTENSION
Scale: AS SHOWN
Date: MAY 1999
Sheet 1 of
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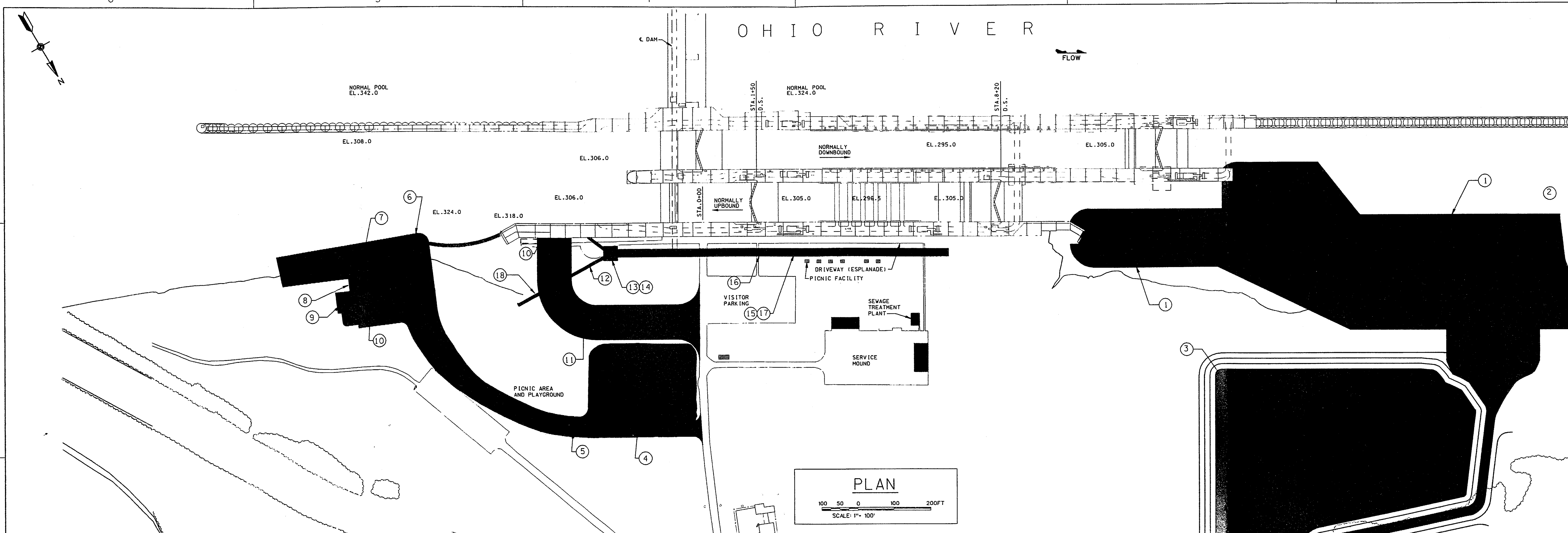
FIGURE 2



KEY

- EXISTING STRUCTURE
- NEW CONSTRUCTION THIS PHASE
- NEW CONSTRUCTION PREVIOUS PHASE

ALL ELEVATIONS ON THIS SHEET ARE REFERENCED TO OHIO RIVER DATUM

NOTE: UPSTREAM AND DOWNSTREAM ACTIVITIES OCCUR CONCURRENTLY.

DOWNSTREAM ACTIVITIES:

1. CONSTRUCT TEMPORARY CONSTRUCTION MOORAGE AREA AND ACCESS ROAD. DREDGE AND EXCAVATE TO EL. 300 AT TEMPORARY CONSTRUCTION MOORAGE AREA AND DREDGE AND EXCAVATE TO EL. 282 BELOW WALL AND GATE MONOLITH LOCATIONS.
2. EXCAVATE AND DREDGE DOWNSTREAM RIVER BANK (NOT SHOWN).
3. CONSTRUCT MOUND FOR LAYDOWN AREA AND CONCRETE BATCH PLANT.

UPSTREAM ACTIVITIES:

4. BUILD MOUND FOR TEMPORARY SPOIL & LAYDOWN AREA.
5. EXTEND TEMPORARY ACCESS ROAD TO NEW MOORING FACILITY.
6. INSTALL SHEETPILE CELL AND ICE & DEBRIS BOOM.
7. DREDGE NEW BOAT BASIN.
8. INSTALL TIEBACK SHEETPILE WALL.
9. FINISH GRADING AND PAVING.
10. RELOCATE EXISTING FLOATING DOCK.
11. PLACE BERM ALONG EXISTING TIEBACK WALL AND EXTEND TO EXISTING ACCESS ROAD TO FORM COFFERDAM BERM.
12. DRILL AND CONSTRUCT SHAFTS FOR WING WALLS (IN ORDER TO BENEFIT FROM EXISTING SOIL LEVEL).
13. DEWATER AREA AND EXCAVATE FOR INTAKE MONOLITH.
14. CONSTRUCT INTAKE MONOLITH IN-THE-DRY.
15. EXCAVATE AND PLACE 16.5' DIA. PRECAST CONCRETE PIPE FOR THE WRAP AROUND CULVERT TO STA. 6+75 +/- (CULVERT STA. 13+50).
16. CONSTRUCT INLET VALVE MONOLITH.
17. PARTIALLY BACKFILL CULVERT EXCAVATION FROM UPSTREAM END TO STA. 6+75 +/- AS PIPE CULVERT IS PLACED.
18. REMOVE COFFERDAM BERM, EXCAVATE, AND PLACE PRECAST CONCRETE PANELS AT INTAKE WING WALLS.

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OHIO RIVER MAIN STEM SYSTEMS STUDY
JOHN T. MYERS LOCKS & DAM
KENTUCKY-INDIANA

600' EXT. ALT. 600C-1
CONSTRUCTION SEQUENCE
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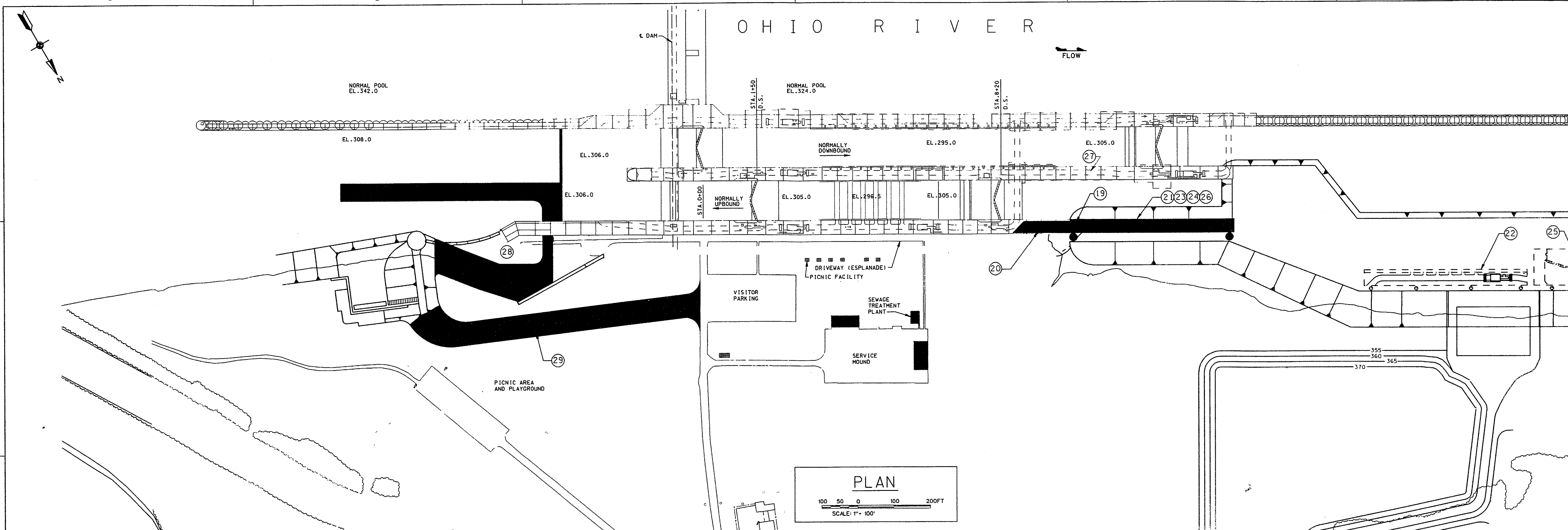
FIGURE 3



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NOTE: UPSTREAM AND DOWNSTREAM ACTIVITIES OCCUR CONCURRENTLY.

DOWNSTREAM ACTIVITIES:

19. DEMOLISH EXISTING MONOLITH L-1.
20. MODIFY EXISTING MONOLITHS L-2 TO L-5 (PLACE CIP CONCRETE ON LANDWARD SIDE OF EXISTING MONOLITHS).
21. PREPARE MONOLITH FOUNDATION.
22. TOW 463-FOOT LONG LAND WALL MONOLITH TO TEMPORARY CONSTRUCTION MOORAGE AREA AND COMPLETE SIDE WALLS.
23. PLACE PEDESTALS. FLOAT LAND WALL MONOLITH TO FINAL LOCATION, AND ADD BALLAST TO LOWER STRUCTURE ONTO PEDESTALS.
24. PLACE UNDERBASE GROUT OR PEA GRAVEL CONCRETE.
25. TOW MITER GATE STRUCTURE AND DIFFUSER MONOLITH TO TEMPORARY CONSTRUCTION MOORAGE AREA. COMPLETE SIDE WALLS OF MITER GATE STRUCTURE.
26. COMPLETE 463-FOOT LONG LAND WALL MONOLITH TO EL. 362.
27. INSTALL ROCK ANCHORS IN MIDDLE WALL MONOLITHS M1 - M4 & M6 - M14.

UPSTREAM ACTIVITIES:

28. DREDGE INTAKE CHANNEL.
29. REMOVE TEMPORARY ACCESS ROAD TO NEW MOORING FACILITY AND BUILD PERMANENT ACCESS ROAD.

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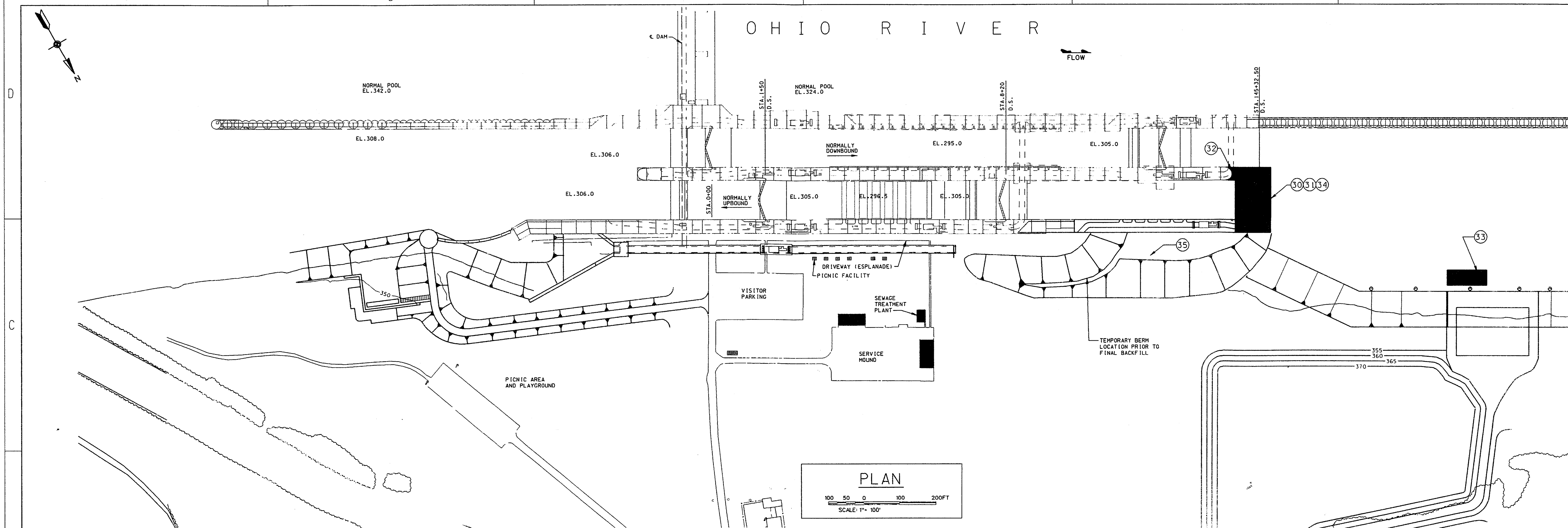
FIGURE 4



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DOWNSTREAM ACTIVITIES:

30. PLACE PEDESTALS. FLOAT MITER GATE STRUTURE TO FINAL LOCATION, AND ADD BALLAST TO LOWER STRUCTURE ONTO PEDESTALS. (JACK AGAINST EXISTING MIDDLE WALL MONOLITH TO ALIGN STRUCTURE.)
31. PLACE UNDERBASE GROUT OR PEA GRAVEL CONCRETE.
32. PLACE CLOSURE POUR BETWEEN EXISTING MIDDLE WALL BULLNOSE MONOLITH AND NEW MITER GATE STRUCTURE.
33. COMPLETE SIDE WALLS OF DIFFUSER MONOLITH AT TEMPORARY CONSTRUCTION MOORAGE AREA.
34. COMPLETE MITER GATE STRUCTURE TO EL. 362.
35. PLACE BACKFILL BEHIND DOWNSTREAM PORTION OF 463-FOOT LONG LAND WALL MONOLITH.

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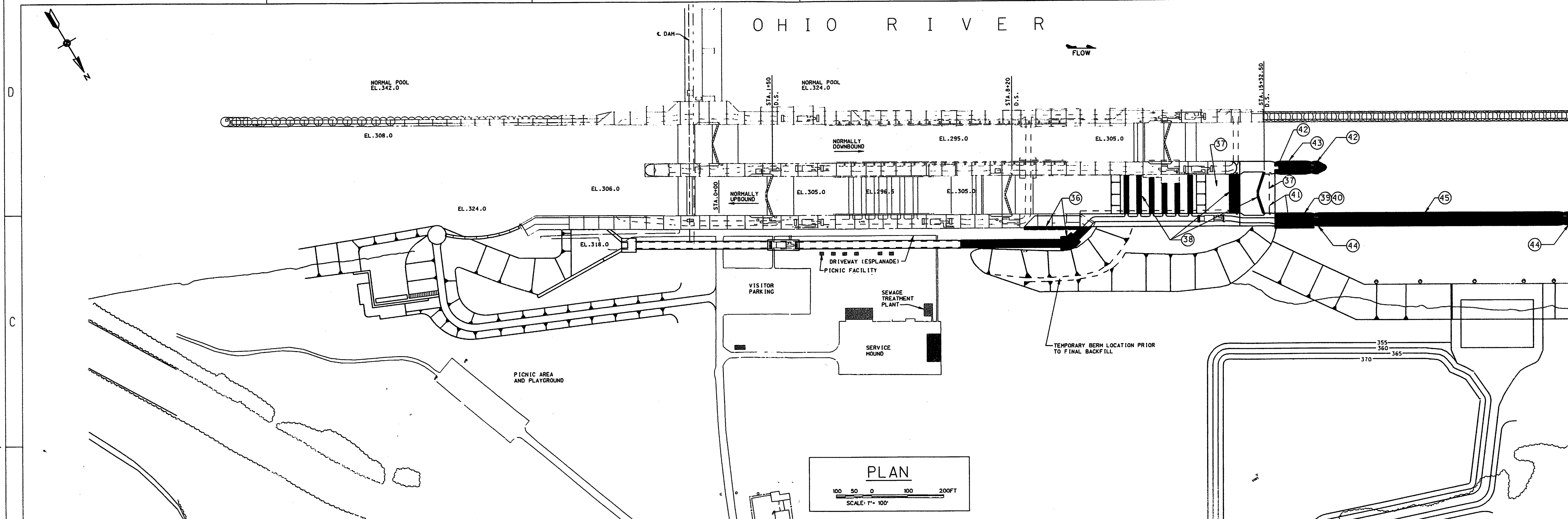
FIGURE 5



KEY

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DOWNSTREAM ACTIVITIES:

36. DEWATER UPSTREAM OF BERM/BACKFILL AT WRAP AROUND CULVERT ELBOW AND THRUST BLOCK, COMPLETE CONSTRUCTION OF THE WRAP AROUND CULVERT, AND CONSTRUCT 7'-6" WIDE CIP CONCRETE HEEL, ANCHORED TO THE LANDSIDE FACE OF MONOLITHS L-2 TO L-5 FOUNDATIONS.
37. INSTALL MAINTENANCE BULKHEAD AND DEWATER LOWER PORTION OF LOCK CHAMBER:
38. EXCAVATE FOR FILL/EMPTY LATERALS AND BULKHEAD SILL. INSTALL NEW MITER GATE AND MACHINERY.
39. FLOAT WALL DIFFUSER TO FINAL LOCATION, AND ADD BALLAST TO LOWER STRUCTURE TO FOUNDATION ELEVATION.
40. PLACE UNDERBASE GROUT OR PEA GRAVEL CONCRETE.
41. COMPLETE WALL DIFFUSER CONSTRUCTION, PLACING TREMIE CONCRETE INTO PRECAST COMPARTMENTS. FILL LOCK CHAMBER AND REMOVE MAINTENANCE BULKHEADS.
42. CONSTRUCT NOSE CELL FOR LOWER MIDDLE FLOATING APPROACH WALL (COMPRISED OF THREE DRILLED SHAFTS) AND CONSTRUCT PYLON PROTRUSION FROM GATE BAY MONOLITH.
43. FLOAT-IN AND INSTALL THE LOWER MIDDLE FLOATING APPROACH WALL PONTOON.
44. CONSTRUCT NOSE CELL FOR LOWER LAND FLOATING APPROACH WALL (COMPRISED OF THREE DRILLED SHAFTS) AND CONSTRUCT PYLON PROTRUSION FROM WALL DIFFUSER MONOLITH.
45. FLOAT-IN AND INSTALL THE LOWER LAND FLOATING APPROACH WALL PONTOON.

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OHIO RIVER MAIN STEM SYSTEMS STUDY
JOHN T. MYERS LOCKS & DAM
KENTUCKY-INDIANA

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CONSTRUCTION SEQUENCE
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Sheet 4 of 5

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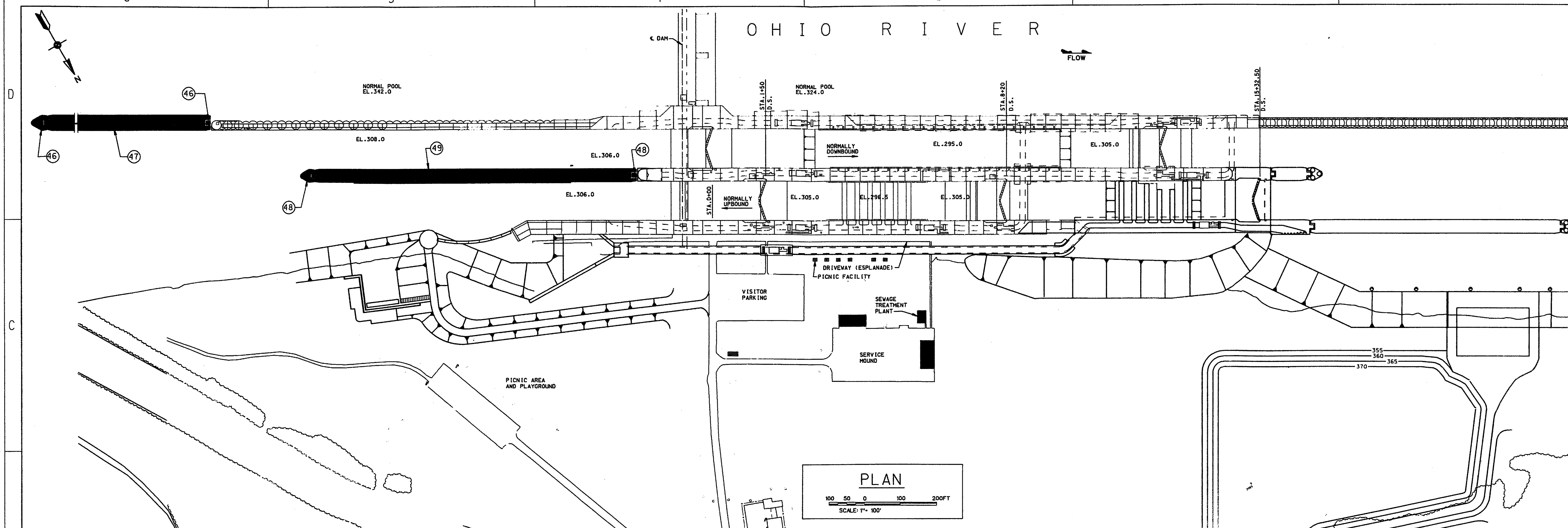
FIGURE 6



KEY

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- NEW CONSTRUCTION THIS PHASE
- NEW CONSTRUCTION PREVIOUS PHASE

ALL ELEVATIONS ON THIS SHEET ARE REFERENCED TO OHIO RIVER DATUM

UPSTREAM ACTIVITIES:

46. CONSTRUCT NOSE CELL FOR UPPER RIVERSIDE FLOATING GUARD WALL (COMPRISED OF THREE DRILLED SHAFTS) AND CONSTRUCT STAND ALONE PYLON AT END OF EXISTING GUARD WALL.
47. ASSEMBLE, FLOAT-IN, AND INSTALL THE UPPER RIVERSIDE FLOATING GUARD WALL PONTOONS.
48. CONSTRUCT NOSE CELL FOR UPPER MIDDLE FLOATING APPROACH WALL (COMPRISED OF THREE DRILLED SHAFTS) AND CONSTRUCT PYLON PROTRUSION FROM THE EXISTING MIDDLE WALL MONOLITH.
49. ASSEMBLE, FLOAT-IN, AND INSTALL THE UPPER MIDDLE FLOATING APPROACH WALL PONTOONS.
50. PERFORM FINAL TESTING OF ALL INSTALLED SYSTEMS.
51. COMMISION NEW CONSTRUCTION.

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CORPS OF ENGINEERS
LOUISVILLE,KENTUCKY

Designed by: S. TEO
Drawn by: C. SULLIVAN
Checked by: L. PIERCE

OHIO RIVER MAIN STEM SYSTEMS STUDY
JOHN T. MYERS LOCKS & DAM
KENTUCKY-INDIANA

600' EXT. ALT. 600C-1
CONSTRUCTION SEQUENCE
DRAWING 5

Scale: AS SHOWN
Date: MAY 1999
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Sheet 5 of 5

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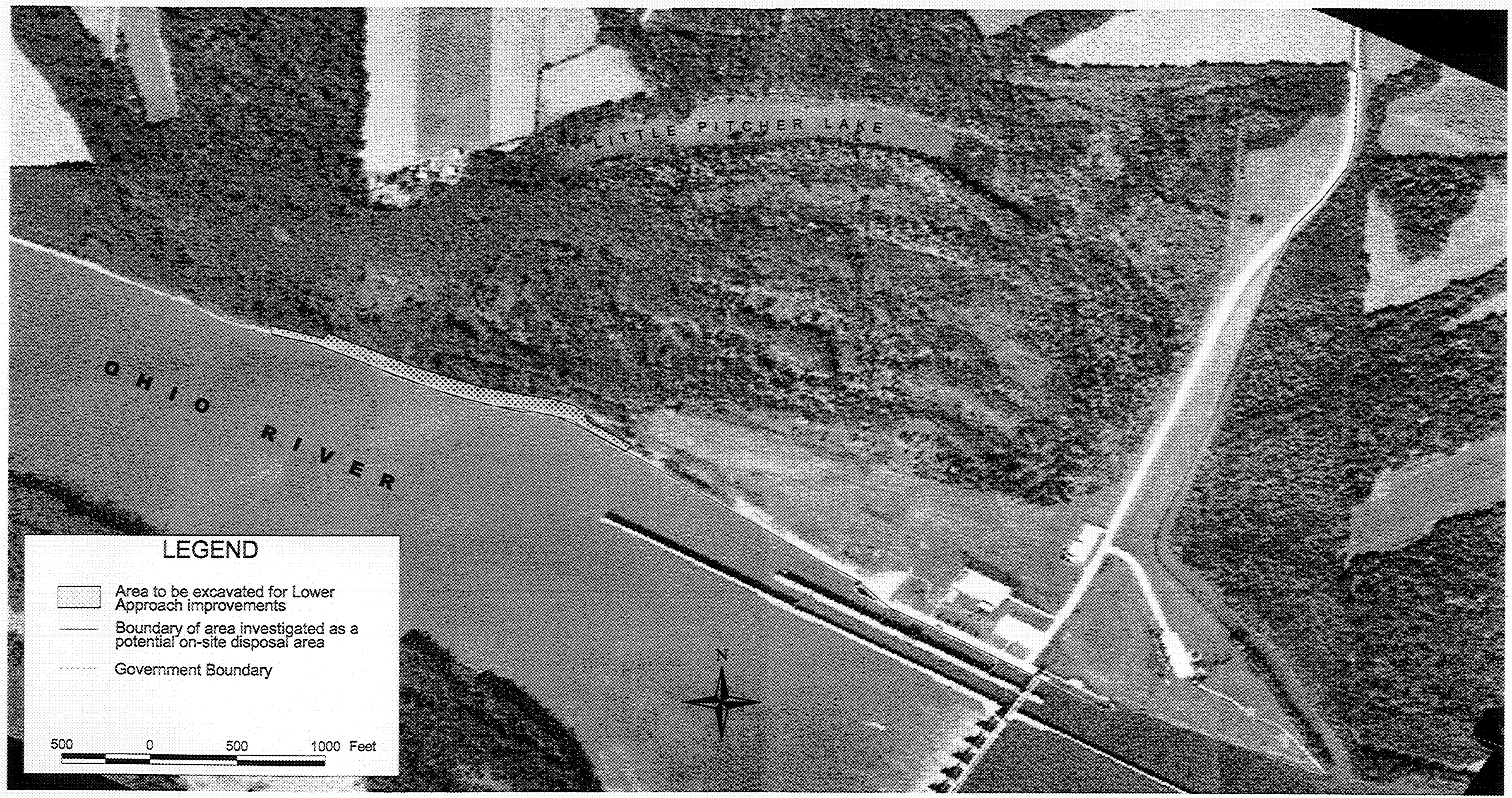
FIGURE 7



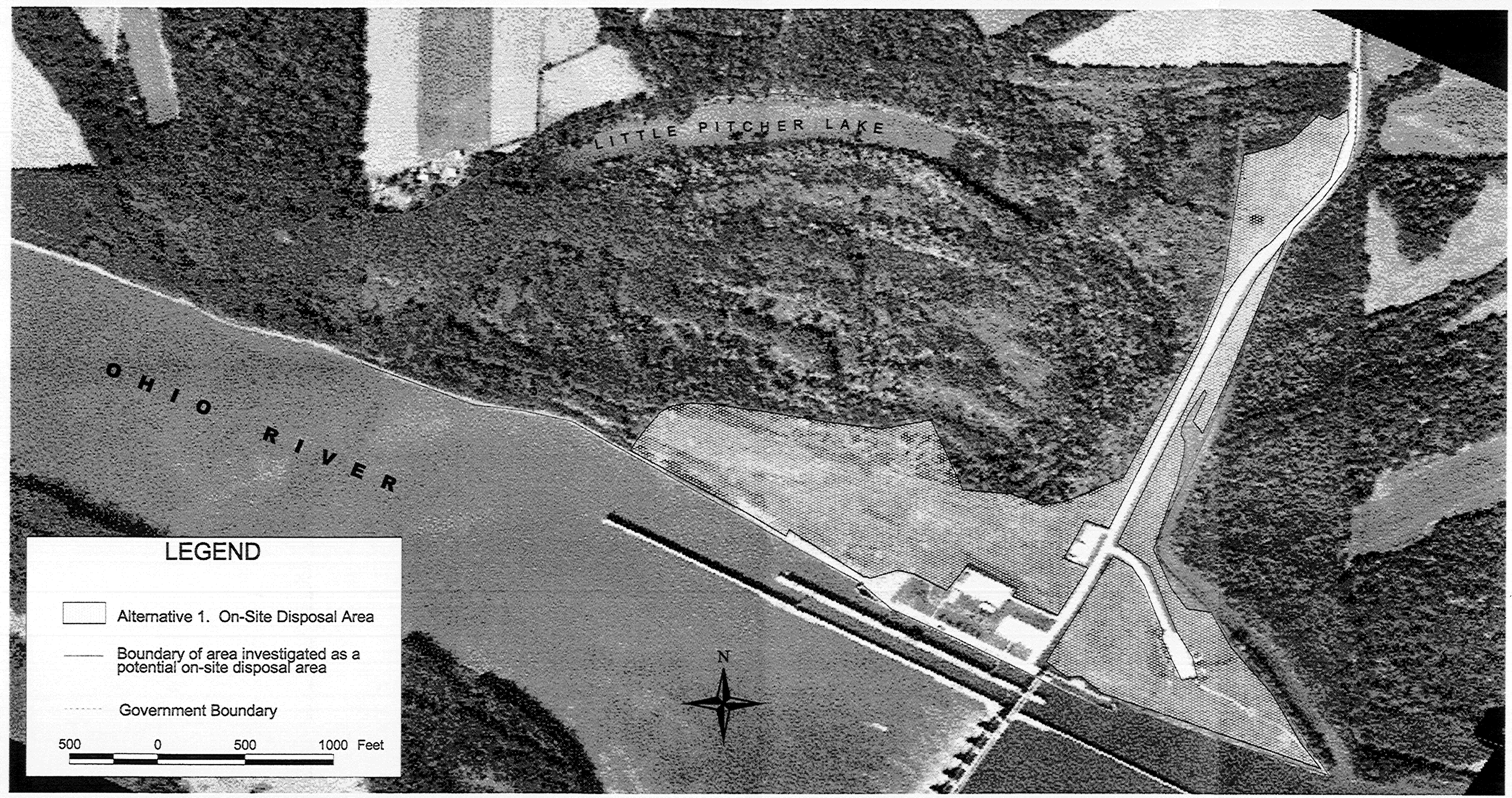
LOWER APPROACH IMPROVEMENTS
SITE SPECIFIC ENVIRONMENTAL IMPACT ASSESSMENT
J.T. MYERS LOCKS AND DAM, OHIO RIVER
POSEY COUNTY, INDIANA

GEC Gulf Engineers & Consultants

Figure No.: 8

Date: July 13, 1999

Source: GEC, Inc.



ALTERNATIVE 1. ON-SITE DISPOSAL AREA
SITE SPECIFIC ENVIRONMENTAL IMPACT ASSESSMENT
J.T. MYERS LOCKS AND DAM, OHIO RIVER
POSEY COUNTY, INDIANA

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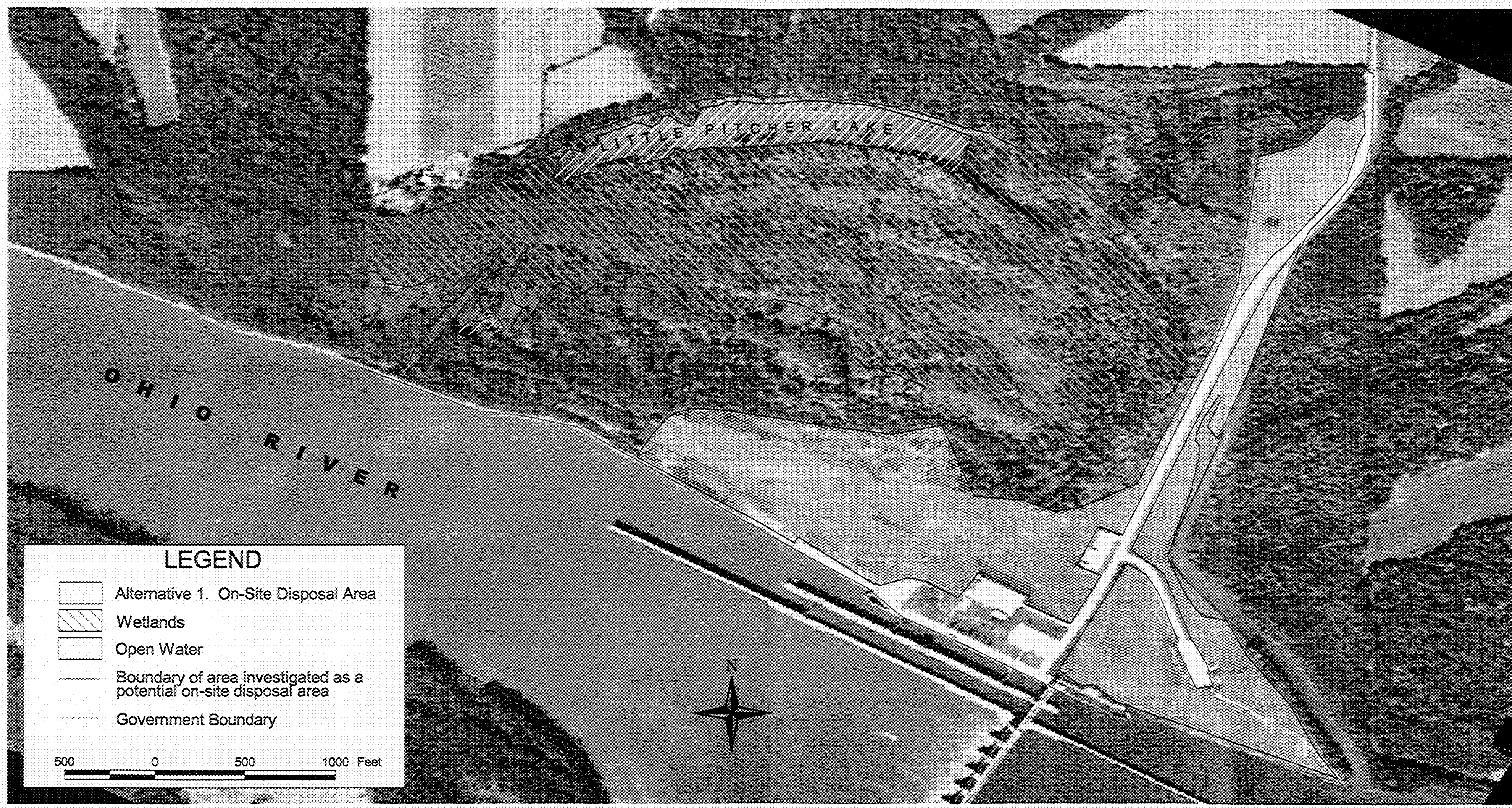
Figure No.: 9

Date: July 13, 1999

Source: GEC, Inc.



WETLAND LOCATION MAP
SITE SPECIFIC ENVIRONMENTAL IMPACT ASSESSMENT
J.T. MYERS LOCKS AND DAM, OHIO RIVER
POSEY COUNTY, INDIANA

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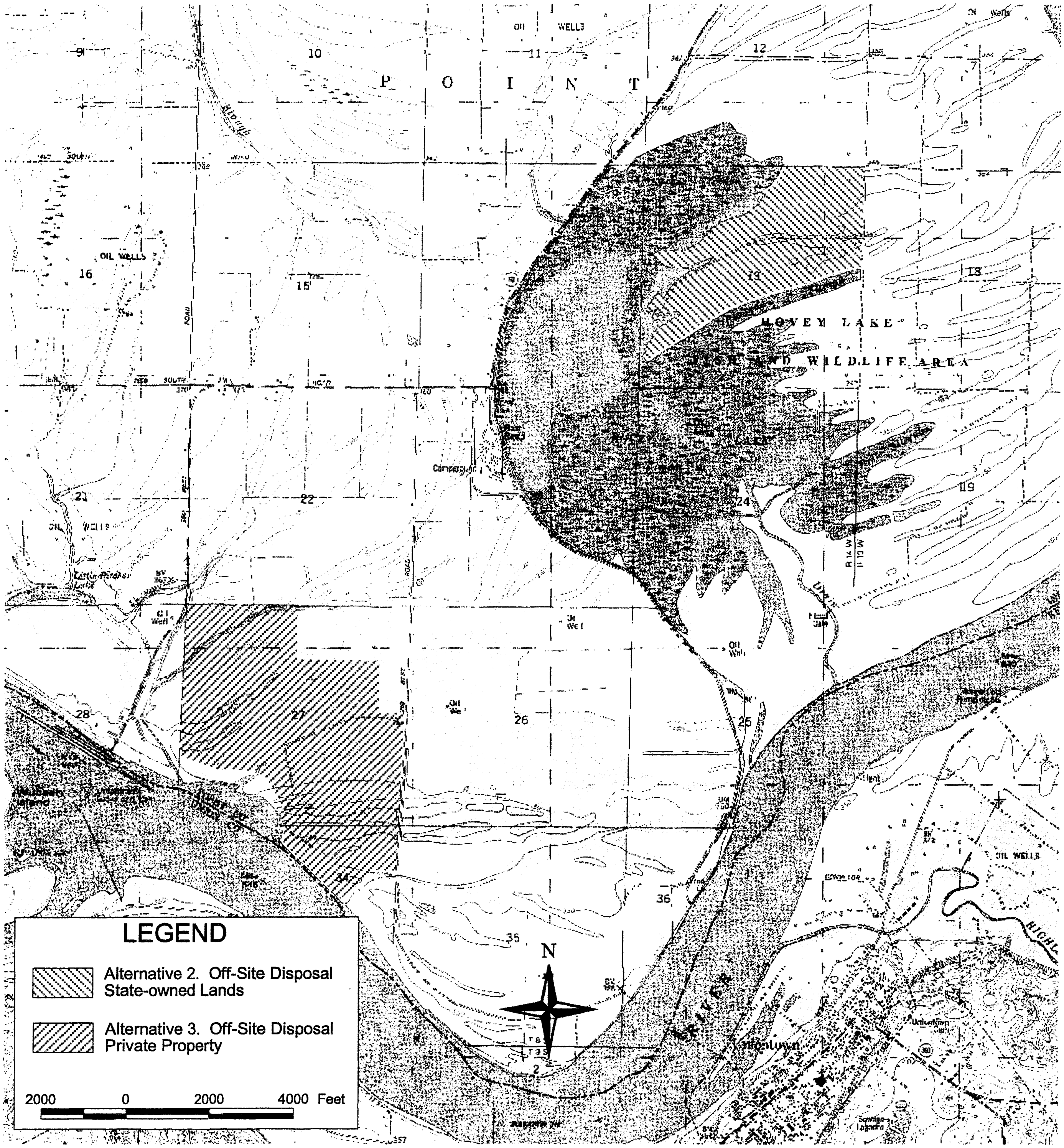
Figure No.: 10

Date: July 13, 1999

Source: GEC, Inc.



ALTERNATIVE 2 & 3 (PROPOSED OFF-SITE DISPOSAL AREAS)
SITE SPECIFIC ENVIRONMENTAL IMPACT ASSESSMENT
J.T. MYERS LOCKS AND DAM, OHIO RIVER
POSEY COUNTY, INDIANA

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Figure No.: 11

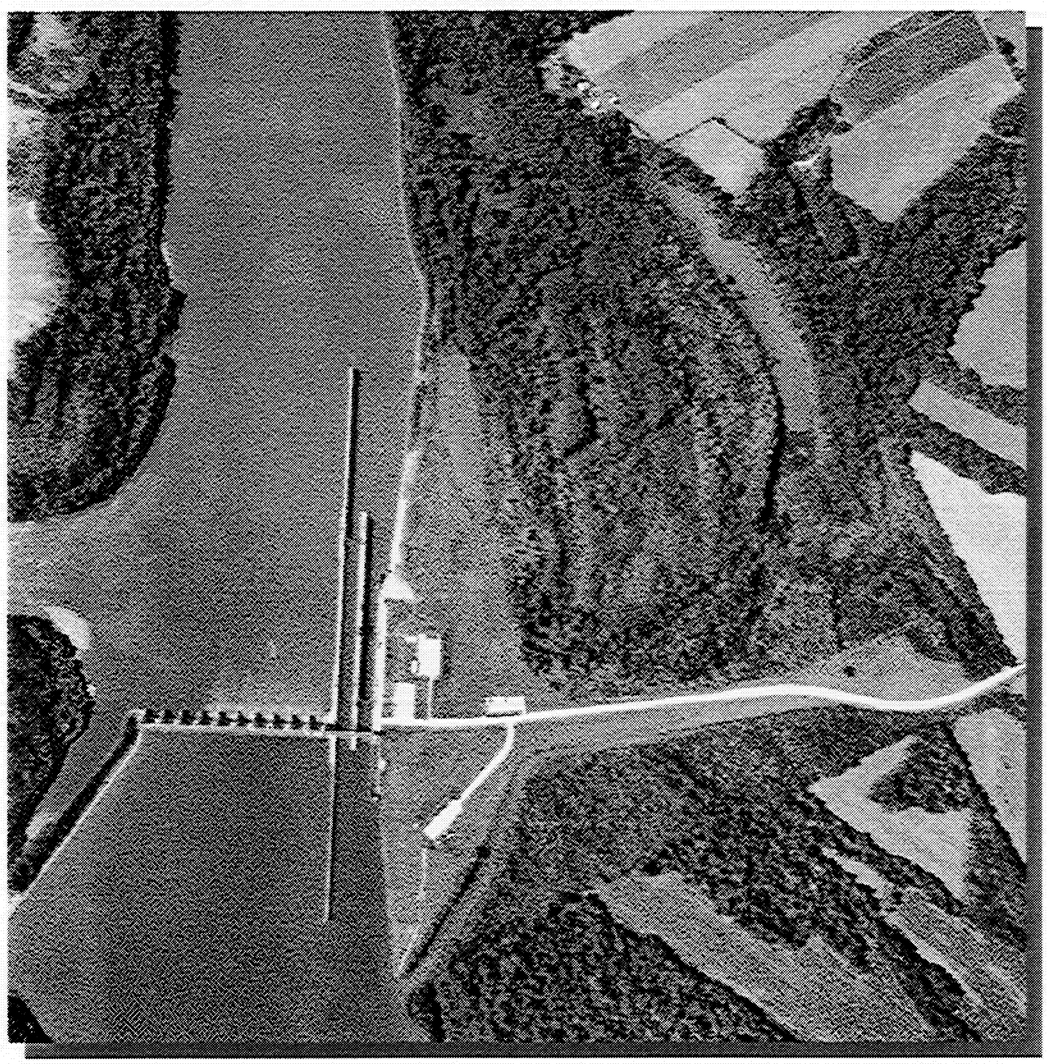
Date: July 13, 1999

Source: GEC, Inc./USGS

J.T. Myers Locks Improvements

Part A-2. Biological Assessment

BIOLOGICAL ASSESSMENT
OHIO RIVER
J. T. MYERS LOCKS AND DAM
POSEY COUNTY, INDIANA



Submitted to

US Army Corps of Engineers
Louisville District

Louisville, Kentucky

Submitted by

GEC
Gulf Engineers & Consultants

Baton Rouge, Louisiana

June 1999

Gulf Engineers & Consultants

June 1999

Draft Report

Contract No. DACW27-97-D-0013
Delivery Order No. 0017
GEC Project No. 27321217

BIOLOGICAL ASSESSMENT OHIO RIVER J. T. MYERS LOCKS AND DAM POSEY COUNTY, INDIANA

Prepared for

U.S. Army Corps of Engineers
Louisville District
Louisville, Kentucky

Prepared by

G.E.C., Inc.
Baton Rouge, Louisiana

Engineering • Economics • Transportation Technology • Social Analysis • Environmental Planning

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BIOLOGICAL ASSESSMENT

BIOLOGICAL ASSESSMENT
OHIO RIVER J.T. MYERS LOCKS AND DAM
POSEY COUNTY, INDIANA

1.0 INTRODUCTION, PURPOSE, AND NEED

G.E.C., Inc. (Gulf Engineers and Consultants) was contracted by the Louisville District, U.S. Army Corps of Engineers (USACE) to prepare a Biological Assessment (BA) of the Indiana bat (*Myotis sodalis*), bald eagle (*Haliaeetus leucocephalus*), and the fat pocketbook mussel (*Potamilus capax).* Potential impacts to these species resulting from the proposed expansion of the northernmost lock at the J.T. Myers Locks and Dam were identified. This work was conducted under Contract No. DACW27-97-D-0013, Delivery Order No. 0017.

This document was prepared in accordance with the guidelines in Section 7 of the Endangered Species Act of 1973, as amended. Typically, BAs include the results of on-site surveys to determine the occurrence of a species, however, in this case, sufficient information is available for the Indiana bat, and the bald eagle to determine that potential habitat exists to support these species. A survey for the fat pocketbook mussel was conducted, and the results are included herein. Information contained in this BA includes the presentation of applicable literature concerning the life history, ecology, specific characteristics and habitat requirements of the Indiana bat, the bald eagle, and the fat pocketbook mussel. Known or high probability of occurrence areas within the proposed project area and an assessment of impacts associated with the proposed activities on the aforementioned endangered species are also included.

J.T. Myers Locks and Dam is located on the Ohio River at approximate River Mile 846 (Figure 1) and are administered and maintained by the Louisville District U.S. Army Corps of Engineers. These locks and dam are essential to the continued use of the Ohio River for waterborne commerce and transport.

The U.S. Army Corps of Engineers is currently conducting the Ohio River Main Stem Systems Study (ORMSS) to identify the best long-term agenda for maintaining a viable navigation system on the main-stem of the Ohio River. Specifically, the study is evaluating the Operation and Maintenance, Major Maintenance, Major Rehabilitation and New Construction investment needs for the 19 navigation locks and dams on the Ohio River Main Stem - with an aim to identify the optimum plan for meeting these needs over the next 40-50 years. These structures are crucial to the orderly development of navigation throughout the Ohio River Basin. As traffic grows through the Ohio River Valley, several lock structures will experience increasing delays. which may be particularly severe during times of maintenance (when one of the existing chambers at any one of the facilities must be closed for routine or emergency repairs or accidents). Other locks will become increasingly unreliable due to age and cycles of use.

The ORMSS final report (due for completion in 2001) is intended to be an authorization document for near-term needs (over the near 10-15 years) and a Master Plan for long-term needs. During the course of the study, a clear justification was found for authorization of large scale improvements at

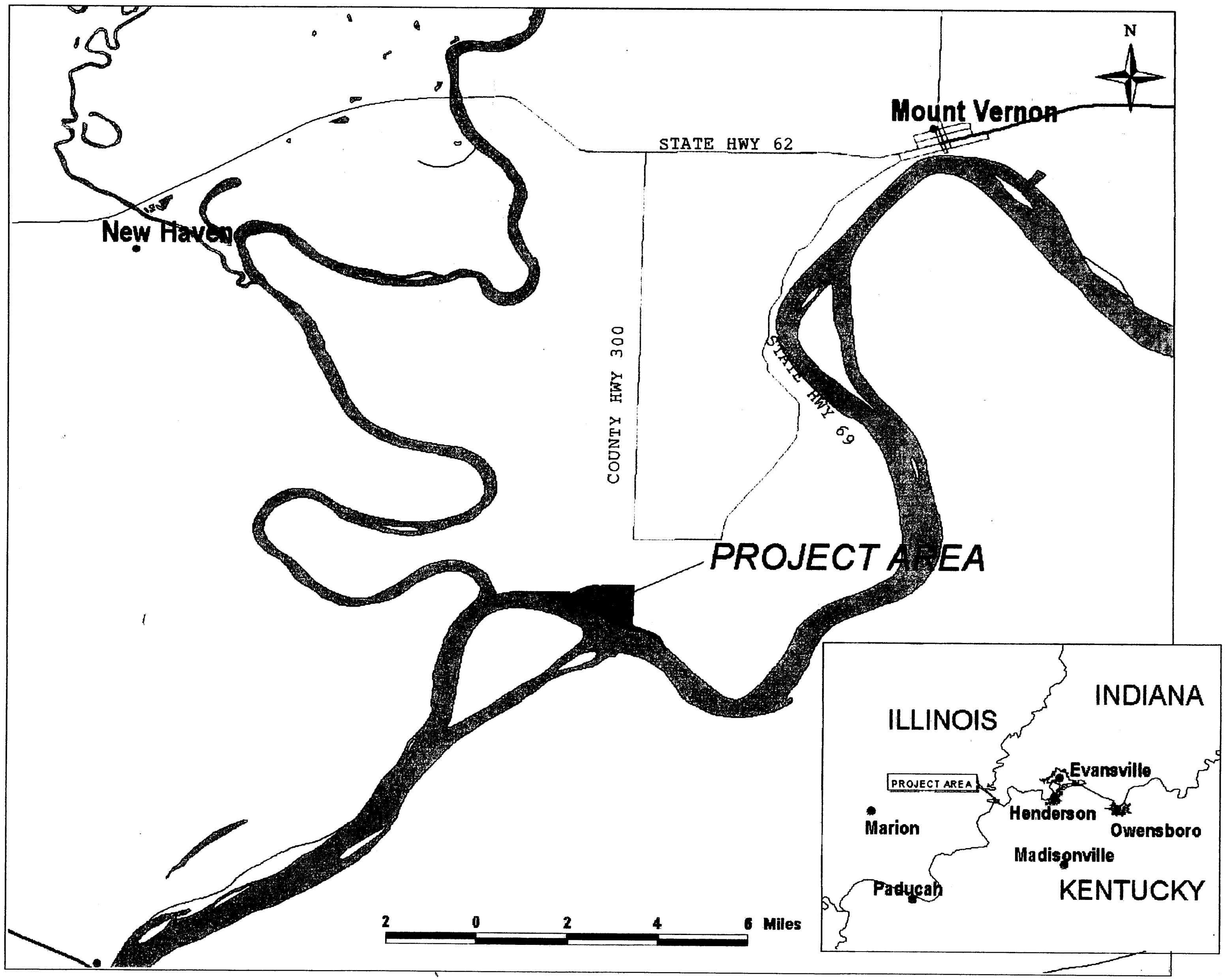


Figure 1. Location of J.T. Myers Locks and Dam

two Ohio River facilities - namely J.T. Myers Locks and Dam and Greenup Lock and Dam. An interim report was prepared which provided the justification and rationale for proceeding to Congressional authorization for these improvements at this time - in advance of the final ORMSS report.

In terms of both traffic levels and delays, the two projects which were the focus of the interim report, (J.T. Myers and Greenup Locks & Dams) are the two busiest lock projects on the Ohio River for which major improvements are not already underway or authorized. Second only to Smithland Lock and Dam, which is located approximately 80 miles downstream of J.T. Myers, J.T. Myers Locks and Dam is the second busiest lock in the U.S. in terms of traffic volume. However, Smithland Lock and Dam has two 1,200-foot long locks to efficiently process long commercial tows. J.T. Myers Locks and Dam has only one 1,200-foot chamber, and a smaller 600-foot auxiliary lock.

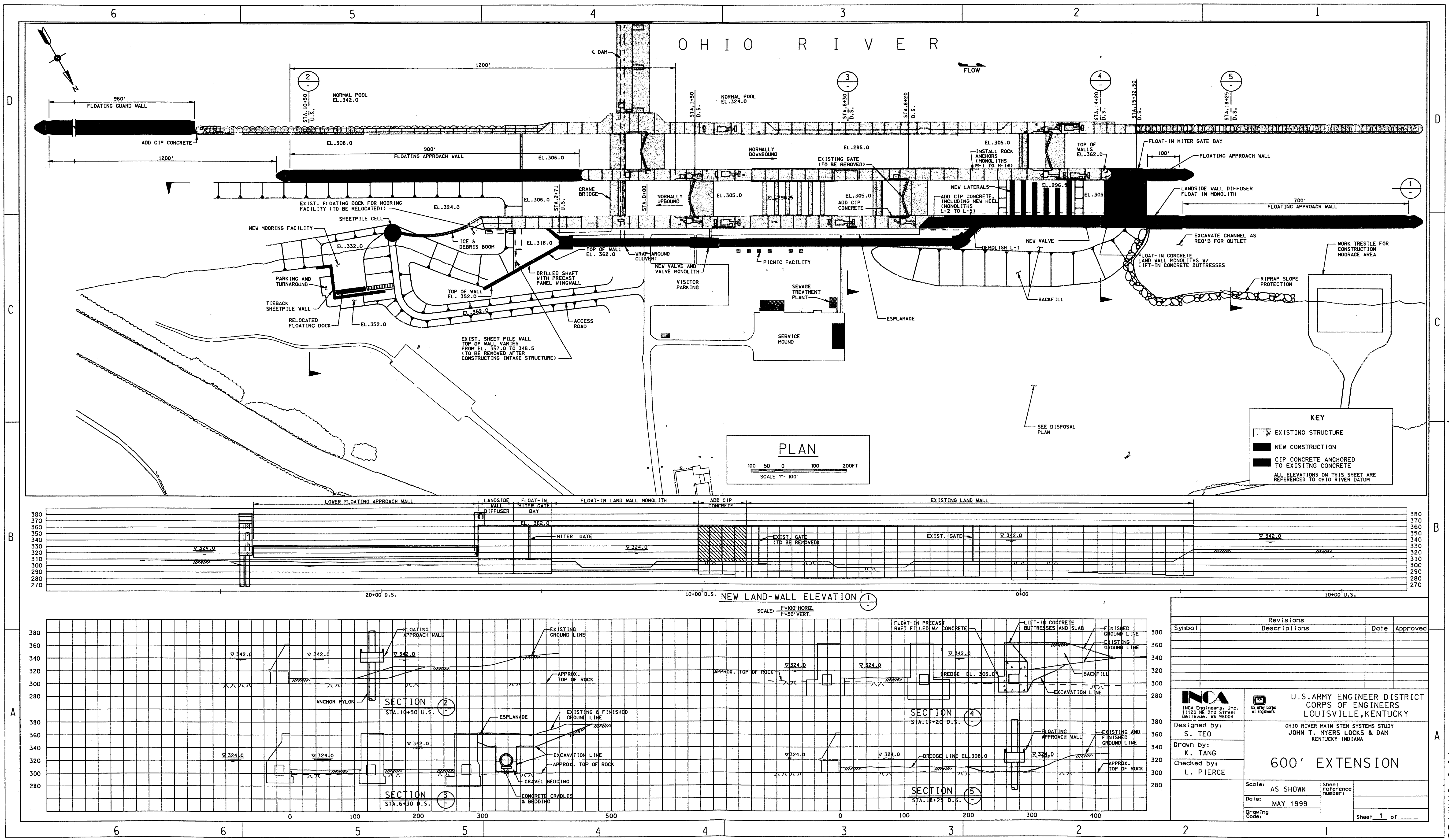
When both lock chambers at J.T. Myers are functioning normally, the capacity of the existing facility is generally adequate to serve traffic levels both now and over the next 10 to 20 years. However, delays do occur since (as in all traffic systems) two, three or more tows sometimes arrive at the lock at nearly the same time. During the last three years, the average delay per tow at J.T. Myers has averaged approximately 45 minutes per tow. By comparison, the average delay at the larger Smithland Locks, which has twin 1,200-foot chambers and about the same traffic level, is about 10 minutes per tow. Given the fact that about 6,200 tows per year transit J.T. Myers Locks and Dam, the delay costs attributable to not having a second 1,200-foot lock chamber at J.T. Myers is about $1.5 million per year at the present time (for a year in which no major maintenance occurs at the facility).

In general, having a second full-size (1,200-foot long) chamber at J.T. Myers Locks and Dam would yield a reduction in tow transit costs on a day-in, day-out basis, and the value of this benefit would grow over time as traffic levels increase.

2.0 PROJECT DESCRIPTION

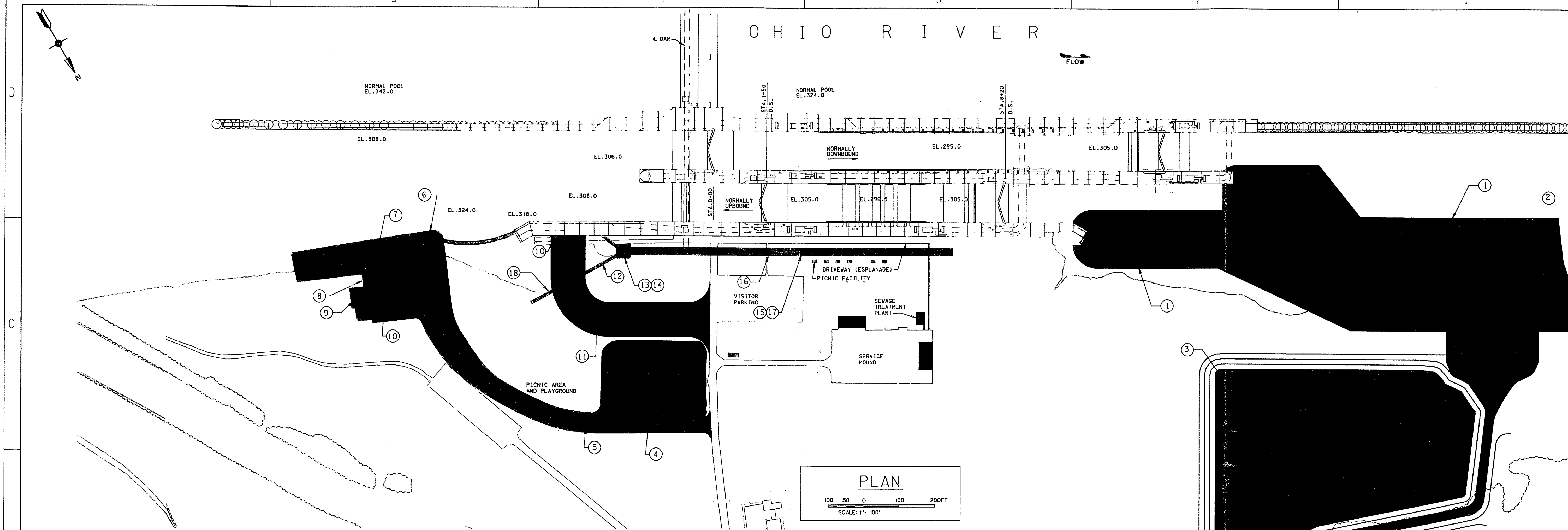
The J.T. Myers Locks and Dam would be upgraded by constructing an extension of the existing 600-foot lock to provide an additional 1,200-foot lock. An approximately 100-foot wide by 1,000-foot portion of the right descending bank would be removed to create an alignment area for barges using the expanded 1,200-foot lock. Figures 2 through 7 provide a layout of the proposed construction areas and a proposed construction sequence. These figures were generated and provided by USACE.

Construction of this project would generate approximately 500,000 cubic yards of dredge material (clay, sand, and silt), that would require disposal. Four disposal alternatives are being considered: (1) On-Site Disposal (Preferred Alternative); (2) Off-Site Disposal on State Owned Lands; (3) Off-Site Disposal on Private Property; and (4) No-Action. Within each of the three action alternatives, two alternate disposal designs exist: contemporary (spread out material evenly within the disposal area) and beneficial use for environmental enhancement/restoration. The following subsections describe each alternative disposal site and disposal design.



OHIO RIVER
FLOW
PLAN
SCALE 1"= 100'
KEY
EXISTING STRUCTURE
NEW CONSTRUCTION
CIP CONCRETE ANCHORED TO EXISITNG CONCRETE
ALL ELEVATIONS ON THIS SHEET ARE REFERENCED TO OHIO RIVER DATUM
960' FLOATING GUARD WALL
900' FLOATING APPROACH WALL
700' FLOATING APPROACH WALL
NORMAL POOL EL.342.0
NORMAL POOL EL.324.0
NEW LAND-WALL ELEVATION
SCALE: 1"=100' HORIZ. 1"=50' VERT.
SECTION STA.10+50 U.S.
SECTION STA.6+30 D.S.
SECTION STA.14+20 D.S.
SECTION STA.18+25 D.S.
U.S.ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE,KENTUCKY
OHIO RIVER MAIN STEM SYSTEMS STUDY
JOHN T. MYERS LOCKS & DAM
KENTUCKY-INDIANA
600' EXTENSION
INCA Engineers, Inc.
11120 NE 2nd Street
Bellevue, WA 98004
Designed by: S. TEO
Drawn by: K. TANG
Checked by: L. PIERCE
Scale: AS SHOWN
Date: MAY 1999
DRAWING 6.0A

FIGURE 2



KEY

- EXISTING STRUCTURE
- NEW CONSTRUCTION THIS PHASE
- NEW CONSTRUCTION PREVIOUS PHASE

ALL ELEVATIONS ON THIS SHEET ARE REFERENCED TO OHIO RIVER DATUM

NOTE: UPSTREAM AND DOWNSTREAM ACTIVITIES OCCUR CONCURRENTLY.

DOWNSTREAM ACTIVITIES:

1. CONSTRUCT TEMPORARY CONSTRUCTION MOORAGE AREA AND ACCESS ROAD. DREDGE AND EXCAVATE TO EL. 300 AT TEMPORARY CONSTRUCTION MOORAGE AREA AND DREDGE AND EXCAVATE TO EL. 282 BELOW WALL AND GATE MONOLITH LOCATIONS.
2. EXCAVATE AND DREDGE DOWNSTREAM RIVER BANK (NOT SHOWN).
3. CONSTRUCT MOUND FOR LAYDOWN AREA AND CONCRETE BATCH PLANT.

UPSTREAM ACTIVITIES:

4. BUILD MOUND FOR TEMPORARY SPOIL & LAYDOWN AREA.
5. EXTEND TEMPORARY ACCESS ROAD TO NEW MOORING FACILITY.
6. INSTALL SHEETPILE CELL AND ICE & DEBRIS BOOM.
7. DREDGE NEW BOAT BASIN.
8. INSTALL TIEBACK SHEETPILE WALL.
9. FINISH GRADING AND PAVING.
10. RELOCATE EXISTING FLOATING DOCK.
11. PLACE BERM ALONG EXISTING TIEBACK WALL AND EXTEND TO EXISTING ACCESS ROAD TO FORM COFFERDAM BERM.
12. DRILL AND CONSTRUCT SHAFTS FOR WING WALLS (IN ORDER TO BENEFIT FROM EXISTING SOIL LEVEL).
13. DEWATER AREA AND EXCAVATE FOR INTAKE MONOLITH.
14. CONSTRUCT INTAKE MONOLITH IN-THE-DRY.
15. EXCAVATE AND PLACE 16.5' DIA. PRECAST CONCRETE PIPE FOR THE WRAP AROUND CULVERT TO STA. 6+75 +/- (CULVERT STA. 13+50).
16. CONSTRUCT INLET VALVE MONOLITH.
17. PARTIALLY BACKFILL CULVERT EXCAVATION FROM UPSTREAM END TO STA. 6+75 +/- AS PIPE CULVERT IS PLACED.
18. REMOVE COFFERDAM BERM, EXCAVATE, AND PLACE PRECAST CONCRETE PANELS AT INTAKE WING WALLS.

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Bellevue, WA 98004

US Army Corps of Engineers

U.S.ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE,KENTUCKY

Designed by: S. TEO
Drawn by: C. SULLIVAN
Checked by: L. PIERCE

OHIO RIVER MAIN STEM SYSTEMS STUDY
JOHN T. MYERS LOCKS & DAM
KENTUCKY-INDIANA

600' EXT. ALT. 600C-1
CONSTRUCTION SEQUENCE
DRAWING 1

Scale: AS SHOWN
Date: MAY 1999
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Sheet reference number:
Sheet 1 of 5

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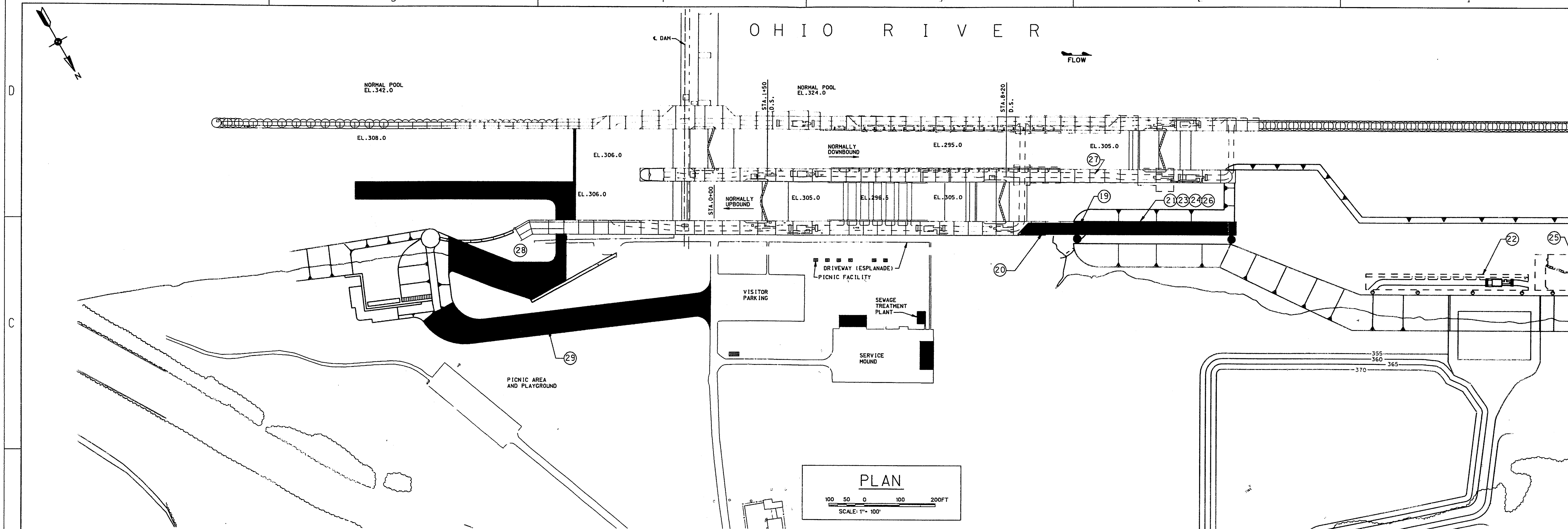
FIGURE 3



KEY

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- NEW CONSTRUCTION PREVIOUS PHASE

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NOTE: UPSTREAM AND DOWNSTREAM ACTIVITIES OCCUR CONCURRENTLY.

DOWNSTREAM ACTIVITIES:

19. DEMOLISH EXISTING MONOLITH L-1.
20. MODIFY EXISTING MONOLITHS L-2 TO L-5 (PLACE CIP CONCRETE ON LANDWARD SIDE OF EXISTING MONOLITHS).
21. PREPARE MONOLITH FOUNDATION.
22. TOW 463-FOOT LONG LAND WALL MONOLITH TO TEMPORARY CONSTRUCTION MOORAGE AREA AND COMPLETE SIDE WALLS.
23. PLACE PEDESTALS, FLOAT LAND WALL MONOLITH TO FINAL LOCATION, AND ADD BALLAST TO LOWER STRUCTURE ONTO PEDESTALS.
24. PLACE UNDERBASE GROUT OR PEA GRAVEL CONCRETE.
25. TOW MITER GATE STRUCTURE AND DIFFUSER MONOLITH TO TEMPORARY CONSTRUCTION MOORAGE AREA. COMPLETE SIDE WALLS OF MITER GATE STRUCTURE.
26. COMPLETE 463-FOOT LONG LAND WALL MONOLITH TO EL. 362.
27. INSTALL ROCK ANCHORS IN MIDDLE WALL MONOLITHS M1 - M4 & M6 - M14.

UPSTREAM ACTIVITIES:

28. DREDGE INTAKE CHANNEL.
29. REMOVE TEMPORARY ACCESS ROAD TO NEW MOORING FACILITY AND BUILD PERMANENT ACCESS ROAD.

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OHIO RIVER MAIN STEM SYSTEMS STUDY
JOHN T. MYERS LOCKS & DAM
KENTUCKY-INDIANA

600' EXT. ALT. 600C-1
CONSTRUCTION SEQUENCE
DRAWING 2

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Sheet 2 of 5

FIGURE 4

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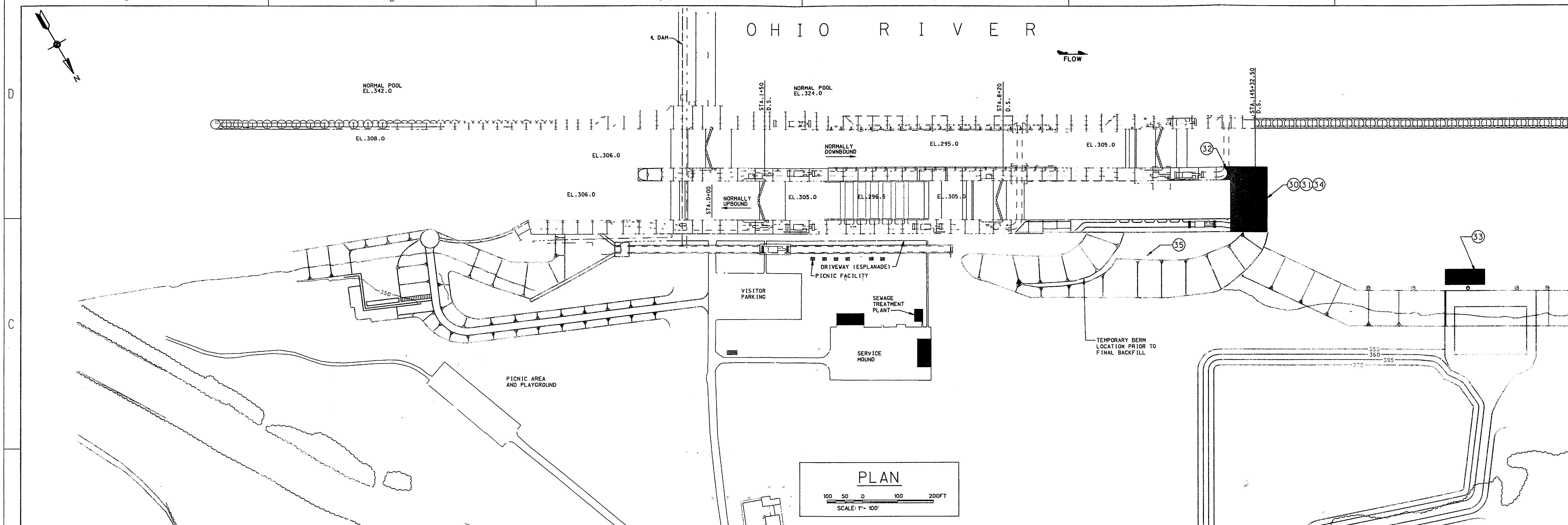

KEY

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DOWNSTREAM ACTIVITIES:

30. PLACE PEDESTALS, FLOAT MITER GATE STRUTURE TO FINAL LOCATION, AND ADD BALLAST TO LOWER STRUCTURE ONTO PEDESTALS. (JACK AGAINST EXISTING MIDDLE WALL MONOLITH TO ALIGN STRUCTURE.)
31. PLACE UNDERBASE GROUT OR PEA GRAVEL CONCRETE.
32. PLACE CLOSURE POUR BETWEEN EXISTING MIDDLE WALL BULLNOSE MONOLITH AND NEW MITER GATE STRUCTURE.
33. COMPLETE SIDE WALLS OF DIFFUSER MONOLITH AT TEMPORARY CONSTRUCTION MOORAGE AREA.
34. COMPLETE MITER GATE STRUCTURE TO EL. 362.
35. PLACE BACKFILL BEHIND DOWNSTREAM PORTION OF 463-FOOT LONG LAND WALL MONOLITH.

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OHIO RIVER MAIN STEM SYSTEMS STUDY
JOHN T. MYERS LOCKS & DAM
KENTUCKY-INDIANA

600' EXT. ALT. 600C-1
CONSTRUCTION SEQUENCE
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Sheet 3 of 5

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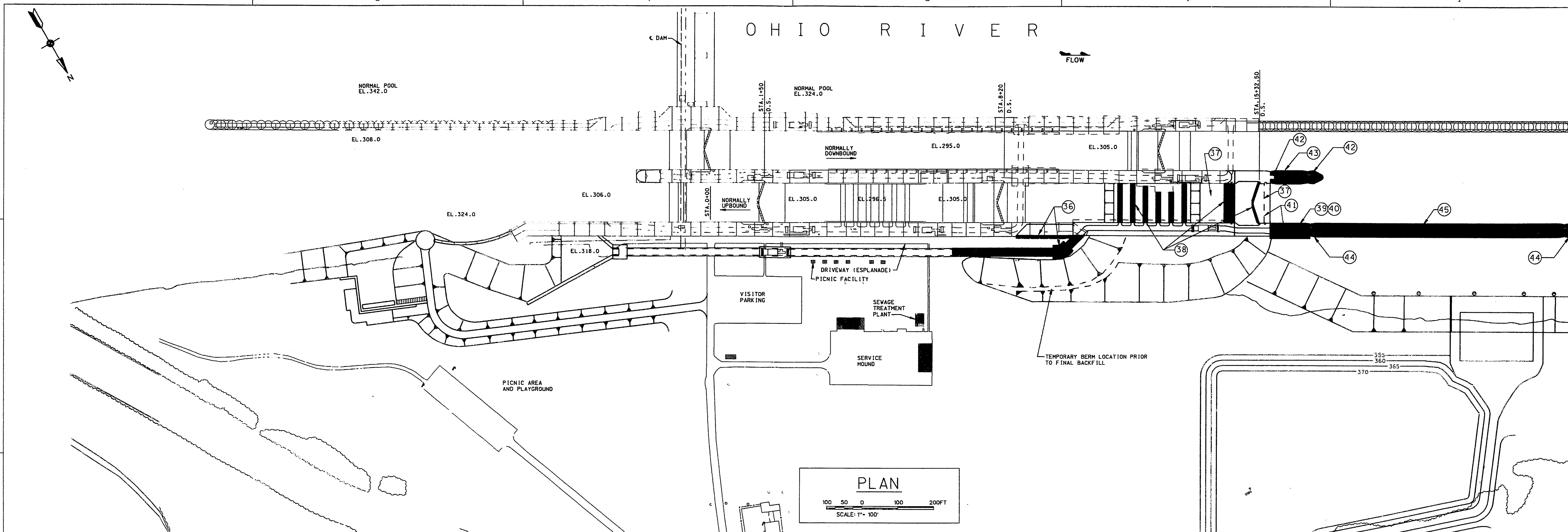
FIGURE 5



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DOWNSTREAM ACTIVITIES:

36. DEWATER UPSTREAM OF BERM/BACKFILL AT WRAP AROUND CULVERT ELBOW AND THRUST BLOCK, COMPLETE CONSTRUCTION OF THE WRAP AROUND CULVERT, AND CONSTRUCT 7'-6" WIDE CIP CONCRETE HEEL, ANCHORED TO THE LANDSIDE FACE OF MONOLITHS L-2 TO L-5 FOUNDATIONS.
37. INSTALL MAINTENANCE BULKHEAD AND DEWATER LOWER PORTION OF LOCK CHAMBER.
38. EXCAVATE FOR FILL/EMPTY LATERALS AND BULKHEAD SILL. INSTALL NEW MITER GATE AND MACHINERY.
39. FLOAT WALL DIFFUSER TO FINAL LOCATION, AND ADD BALLAST TO LOWER STRUCTURE TO FOUNDATION ELEVATION.
40. PLACE UNDERBASE GROUT OR PEA GRAVEL CONCRETE.
41. COMPLETE WALL DIFFUSER CONSTRUCTION, PLACING TREMIE CONCRETE INTO PRECAST COMPARTMENTS. FILL LOCK CHAMBER AND REMOVE MAINTENANCE BULKHEADS.
42. CONSTRUCT NOSE CELL FOR LOWER MIDDLE FLOATING APPROACH WALL (COMPRISED OF THREE DRILLED SHAFTS) AND CONSTRUCT PYLON PROTRUSION FROM GATE BAY MONOLITH.
43. FLOAT-IN AND INSTALL THE LOWER MIDDLE FLOATING APPROACH WALL PONTOON.
44. CONSTRUCT NOSE CELL FOR LOWER LAND FLOATING APPROACH WALL (COMPRISED OF THREE DRILLED SHAFTS) AND CONSTRUCT PYLON PROTRUSION FROM WALL DIFFUSER MONOLITH.
45. FLOAT-IN AND INSTALL THE LOWER LAND FLOATING APPROACH WALL PONTOON.

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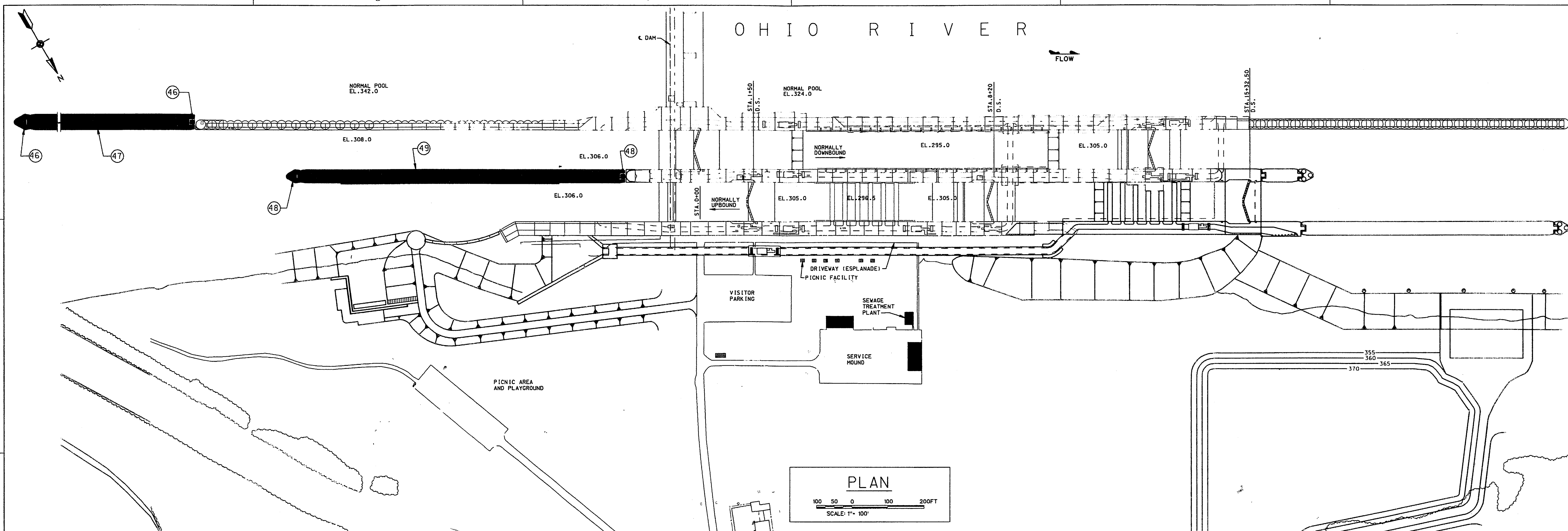
FIGURE 6



KEY

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- NEW CONSTRUCTION PREVIOUS PHASE

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UPSTREAM ACTIVITIES:

46. CONSTRUCT NOSE CELL FOR UPPER RIVERSIDE FLOATING GUARD WALL (COMPRISED OF THREE DRILLED SHAFTS) AND CONSTRUCT STAND ALONE PYLON AT END OF EXISTING GUARD WALL.
47. ASSEMBLE, FLOAT-IN, AND INSTALL THE UPPER RIVERSIDE FLOATING GUARD WALL PONTOONS.
48. CONSTRUCT NOSE CELL FOR UPPER MIDDLE FLOATING APPROACH WALL (COMPRISED OF THREE DRILLED SHAFTS) AND CONSTRUCT PYLON PROTRUSION FROM THE EXISTING MIDDLE WALL MONOLITH.
49. ASSEMBLE, FLOAT-IN, AND INSTALL THE UPPER MIDDLE FLOATING APPROACH WALL PONTOONS.
50. PERFORM FINAL TESTING OF ALL INSTALLED SYSTEMS.
51. COMMISION NEW CONSTRUCTION.

Revisions			
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$TIME$

FIGURE 7

2.1 Alternative 1: On-Site Disposal (Preferred Alternative). On-site disposal would be confined primarily to the southern portion of the approximate 300-acre site adjacent to the existing J.T. Myers Locks and Dam (Figure 8). The habitats present within the proposed disposal areas on-site include an open prairie, and ash/hackberry scrub shrub. The prairie was established by the USACE in partnership with the Indiana Department of Natural Resources in 1996 as a restoration project under Section 1135 of the Water Resources Development Act of 1986. It was planted in a mixture of native prairie grasses and range plants. It is easily recognized by the presence of little and big bluestem as well as other annuals and perennials.

The ash/hackberry scrub is a non-wetland opening adjacent to and north of the maintained clearing and prairie areas and is comprised of American elm (*Ulmus americana*), hackberry (*Celtis laevigata*) and green ash (*Fraxinus pennsylvanica*) saplings with a dense understory of leadplant, poison ivy (*Toxicodendron radicans*), and various perennials and annuals. It appears that these areas may have been cleared for agricultural use prior to Corps ownership and has since been used for spoil disposal.

Based on the findings of an on-site wetland delineation conducted in 1999, no wetlands are present within the proposed on-site disposal area.

2.1.1 Contemporary Design. Under the contemporary design, approximately 500,000 cubic yards of material would be deposited over 20.4 acres of prairie, 63.6 acres of open frequently maintained open land, and approximately 10 acres of scrub shrub habitat. Upon project completion, the prairie area would be restored using the original project specifications, and the scrub shrub area would be re-planted using a mixture of indigenous bottomland hardwood species.

2.1.2 Beneficial Use for Environmental Enhancement. Originally, it was proposed that the dredge material be used to construct a series of levees throughout the site to create greentree reservoirs for waterfowl management. However, after a thorough on-site reconnaissance it was determined that a sufficient amount of natural levees and man-made roads exist on the site, and that management of the hydroperiod through a control structure in the southwest portion of the site, which is maintained by the Hovey Lake Manager, has created a setting for a majority of the site to function as a greentree reservoir in the winter. Further, it was discussed that the impacts associated with construction of levees would not justify the benefits gained through creation of a greentree reservoir in this area. Therefore, this alternative disposal design was eliminated from further consideration.

2.2 Alternative 2: Off-Site Disposal on State Owned Lands. Indiana Department of Natural Resources (IDNR) owns an approximately 14.3-acre tract located northeast of Hovey Lake (Figure 9). This area is currently under an agriculture outlease and is planted in row crops including soybeans and/or corn depending on the market and on-site conditions. Portions of this area undergo periodic flooding.

ALTERNATIVE 1. ON-SITE DISPOSAL AREA
BIOLOGICAL ASSESSMENT
J.T. MYERS LOCKS AND DAM, OHIO RIVER
POSEY COUNTY, INDIANA

GEC
Gulf Engineers & Consultants

Figure No: 8
Date: June 9, 1999
Scale: 1:10,440
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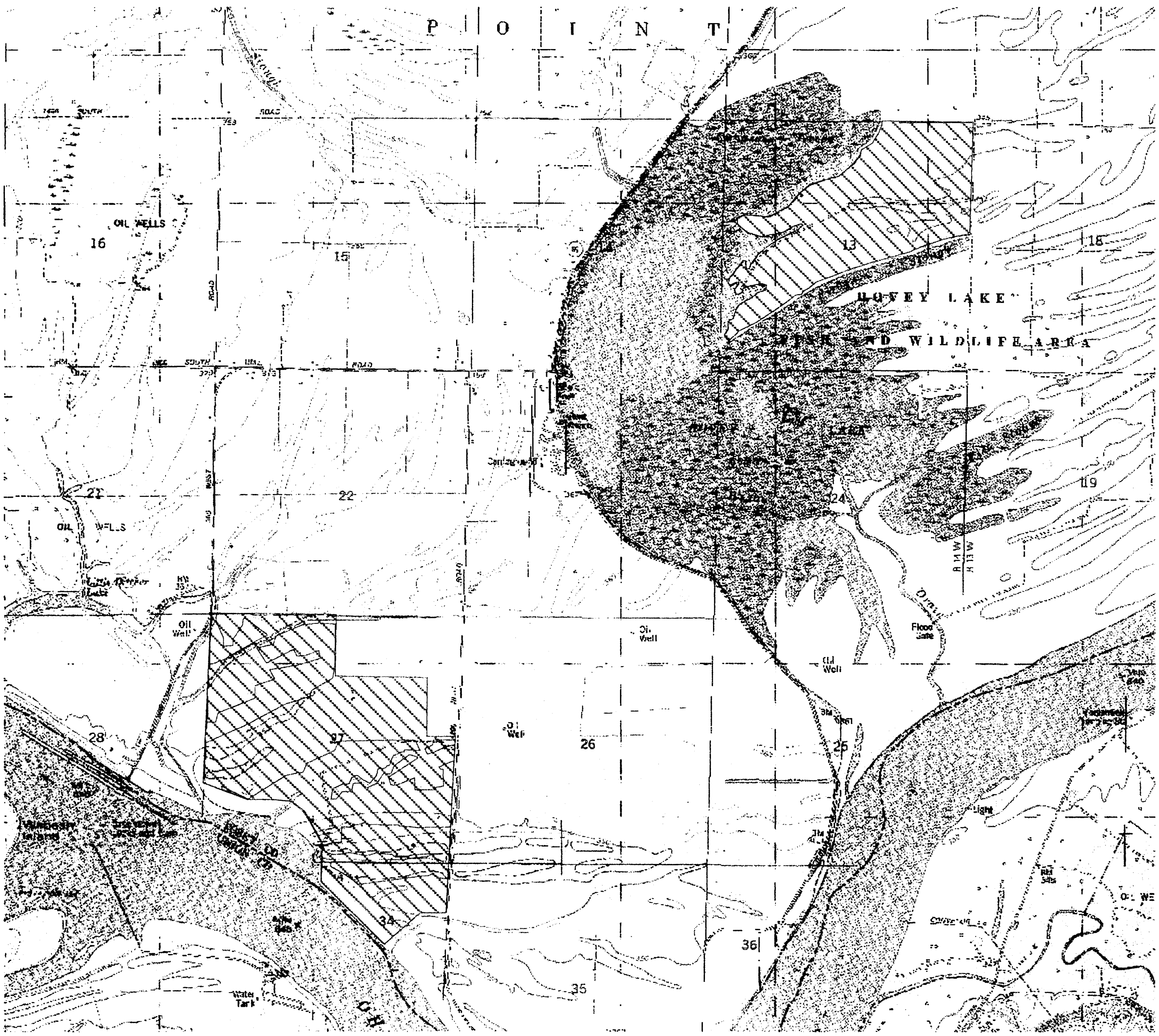

LEGEND

Alternative 2. Off-Site Disposal State Owned Lands

Alternative 3. Off-Site Disposal Private Property

Gulf Engineers & Consultants

ALTERNATIVE 2 & 3 (PROPOSED OFF-SITE DISPOSAL AREAS)
BIOLOGICAL ASSESSMENT
J.T. MYERS LOCKS AND DAM, OHIO RIVER
POSEY COUNTY, INDIANA

Figure No:	**9**
Date:	**June 9, 1999**
Scale:	**1"=2000'**
Source:	**GEC/USGS**

2.2.1 Contemporary Design. Under the contemporary design, the area would receive approximately 500,000 cubic yards of dredge material. The material would be evenly spread to raise the elevation approximately two feet, and the area would continue to be farmed.

2.2.2 Beneficial Use for Environmental Restoration. Under this alternative, a series of small levees would be constructed to create cells to be managed as moist soil units for waterfowl management. The water levels would be controlled by a series of control structures, and they would be inundated to approximately 12 inches beginning in the fall and gradually drained by the early spring. Specific location and design would be generated at a later date. It is anticipated that construction of the levees would not utilize the entire amount of material generated (500,000 cubic yards), and therefore this method would also include some of the contemporary design described in Section 2.2.1.

2.3 Alternative 3: Off-Site Disposal On Private Property. The USACE has selected for evaluation an alternate disposal site adjacent to the existing lock and dam site and bordering State-owned lands that are managed by IDNR. This approximately 467-acre tract (Figure 9) contains a mixture of bottomland hardwoods and open agriculture fields.

2.3.1 Contemporary Design. Under the contemporary design, the areas currently being farmed would receive approximately 500,000 cubic yards of material. The material would be evenly spread over approximately 263 acres (open agriculture land) to raise the elevation approximately one foot, and the area would continue to be farmed.

2.3.2 Beneficial Use for Environmental Restoration. Under this alternative, the areas currently being farmed would receive approximately 500,000 cubic yards of material. The material would be evenly spread over approximately 263 acres to raise the elevation approximately one foot, and the area would be restored to bottomland hardwoods. The intent of the restoration would be to reduce forest fragmentation in the area and provide additional wildlife habitat. This would also provide a wildlife corridor to adjacent wooded tracts.

3.0 LITERATURE REVIEW

3.1 Indiana Bat (*Myotis sodalis*)

3.1.1 Species Description. The Indiana bat is a medium-sized monotypic species (no subspecies) of the genus *Myotis* closely resembling the little brown bat (*Myotis lucifugus*) and the northern long-eared bat (*Myotis septentrionalis*), but differing in coloration. The head and body length range from 1-5/8 to 1-7/8 inches. Its forearm length is 1-3/8 to 1-5/8 inches (USFWS, 1999). The heel of the foot (calcar) is strongly keeled with the hind feet smaller and more delicate than that of the little brown bat. The Indiana bat's fur is a dull grayish chestnut (as opposed to the bronze fur of the little brown bat) with the basal portion of the hairs on the back a dull lead color. Underparts are pinkish to cinnamon but do not contrast as strongly as that of the little brown bat or the northern long-eared bat.

3.1.2 Taxonomic Status. The Indiana bat is in the order *Chiroptera*, family *Vespertilionidae*.

3.1.3 Geographic Range. The Indiana bat occurs in the midwestern and eastern United States from the western edge of the Ozark region in Oklahoma to southern Wisconsin, east to Vermont, and as far south as the northern portion of Florida. The Indiana bat is apparently absent south of Tennessee in the summer and absent from Michigan, Ohio, and northern Indiana where suitable caves and mines are unknown. During the winter, Indiana bats are restricted to suitable hibernacula primarily located in irregular limestone regions with sinks, underground streams, and caverns located in the east central United States.

More than 85 percent of the range wide population occupies nine Priority 1 hibernacula (hibernation sites with a recorded population >30,000 bats since 1960 – although two of these currently have extremely low numbers of bats). Indiana, Kentucky, and Missouri each contain three Priority 1 hibernacula. Priority 2 hibernacula (recorded population >500 but <30,000 bats since 1960) are known from the aforementioned states, as well as Arkansas, Illinois, New York, Ohio, Tennessee, Virginia, and West Virginia. Priority 3 hibernacula with recorded populations <500 bats or records of single hibernating individuals have been reported in 17 states (USFWS, 1999).

3.1.4 Habitat. Winter habitat for the Indiana bat includes limestone caves and mines that maintain temperatures appropriate for hibernation. Ideal sites are those with a low probability for freezing with temperatures 50° Fahrenheit (F) when they arrive in October and November. Early studies identified a preferred mid-winter temperature range of 39°–46° F, but a recent examination of long term data suggests that a slightly lower and narrower range of 37°–43° F may be ideal for this species (USFWS, 1999). Studies show that humidity is above 74 percent but below saturation, and averaging 87 percent during hibernation, with humidity potentially being an important factor in successful hibernation.

Summer habitat requirements for this species are not as well documented as winter habitat requirements. Historically, floodplain and riparian forests were thought to be primary roosting and foraging habitats during the summer. However, recent records show males to use upland forests for roosting with foraging occurring in upland forests, old fields, and pastures with scattered trees. Summer foraging by females and juveniles is limited to riparian and floodplain areas. Creeks are apparently not used if riparian trees have been removed (USFWS, 1991). Female bats and juveniles form nursery colonies in trees with loose or exfoliating bark, with males roosting singularly in similar structures. Records exist of Indiana bats being found in old buildings and under bridges.

There are recent records of the Indiana bat from Hovey Lake (which is within one mile of the proposed project site) and other nearby forests. Suitable summer habitat exists on the proposed project site; roosting habitat is present in the central and northern portion of the site, and foraging habitat is present throughout the site.

3.1.5 Life History. Hibernation of Indiana bats begins in October and extends through April (September–May in northern regions), depending on local weather conditions. The Indiana bat hibernates in large clusters ranging up to 300 bats per square foot. Table 3.1 depicts the annual chronology of Indiana bat.

The bats arrive at the hibernacula locations prior to hibernation (August to September) and begin "swarming." Swarming is a behavior where large numbers of bats fly in and out of cave entrances

Table 3.1. Indiana Bat Annual Chronology

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Both sexes:											
		Hibernation							Hibernation		
Females			Emerge	Pregnant			Swarming				
Females					Lactating						
Young					Born	Flying					
Males			Emerge				Swarming				
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

Source: U.S. Fish and Wildlife Service, 1999.

from dusk to dawn, while relatively few roost in the caves during the day (Cope and Humphrey, 1977). This behavior continues for several weeks with mating occurring towards the end of this period. During the swarming period, the males remain more active over a longer period than the females, possibly to mate with late arriving females. As Indiana bats forage, prior to hibernation ,they replenish fat supplies that were depleted during migration. Hibernation generally occurs in the same cave where swarming occurs, but swarming has been documented in caves other than hibernaculum sites (USFWS, 1999). Females begin hibernation directly after mating, with the remaining majority of both sexes hibernating by the end of November. During hibernation, bats form large, tight, compact clusters. Individuals hang by their feet from the ceiling. Approximately every eight to 10 days, individuals awaken and spend approximately one hour flying around the cave, or joining a small cluster of active bats before returning to hibernation.

Female Indiana bats store semen during the winter and become pregnant after emergence from hibernation through a process known as delayed fertilization. Females emerge from hibernation earlier than do the males. Once females arrive at their summer habitat, they utilize a number of small roost sites until a larger maternity colony (100 or fewer adults) is established. Young (single bat per adult) are born in late June to early July and are able to fly between mid July and early August. Males disperse throughout the range and either roost individually or in small numbers in or near the same type of trees as the females, with some males remaining near the hibernaculum. The remainder of the summer is spent storing fat reserves for the fall migration.

Indiana bats feed strictly on flying insects, the type of which depends on the foraging environment. They will feed on both aquatic and terrestrial insects. Diet varies seasonally and variation is observed among different ages, sexes, and reproductive status groups (Belwood, 1979; Lee, 1993). It is suspected that due to the higher energy demands of reproductively active females and juveniles, there is a greater dietary diversity than among males and non-reproductively active females. Major prey includes moths, caddisflies, flies, mosquitoes, and midges. Other prey includes bees, wasps, flying ants, beetles, leafhoppers, treehoppers, stoneflies, and lacewings.

3.1.6 Status. The Indiana bat is Federally endangered throughout its range and was listed as such in the Federal Register, March 11, 1967. The known Indiana bat population is estimated at 353,000 bats (based on census data taken at hibernacula) which is a decline in the population of about 60 percent since the 1960s. Table 3.2 provides a summary of the known hibernating Indiana bat populations by State. Two states show the most severe decline in Indiana bat populations, Kentucky and Missouri, where 180,000 bats were lost between 1960–1997, and 250,000 bats were lost during 1980–1997, respectively.

Table 3.2. Summary of Hibernating Indiana Bat Populations by State

State	Estimated Population: Historic Level (1960 or Earliest No.)	When Regular Surveys Began (~1980)	Most Recent Survey (1995-1997)
Alabama	300	300	300
Arkansas	14,930	14,830	2,700
Illinois	4,140	3,990	4,530
Indiana	177,885	124,080	182,510
Kentucky	241,335	96,235	61,370
Missouri	323,120	302,915	47,135
New York	7,805	7,805	14,990
Ohio	--	--	9,300
Pennsylvania	65	65	270
Tennessee	19,305	19,305	16,580
Virginia	5,620	5,620	1,840
West Virginia	4,700	4,675	11,660
Total	808,505	589,120	353,185

Source: U.S. Fish and Wildlife Service, 1999.

The population in Indiana appeared to decline through 1980 but has since shown a steady increase in numbers. Approximately 182,000 (about one-half of the total Indiana bat population) is located in Indiana.

3.1.7 Reason for Decline. Several documented causes can be attributed to the decline in populations of Indiana bats. However, according to the U.S. Fish and Wildlife Service, the known factors do not appear to account for the current rate of decline. Known disturbances that have resulted in a decline in the population include disturbance and vandalism, improper cave gates and structures, and natural hazards.

Disturbance of the bats during hibernation can result in as much as a 68-day expenditure of fat per occurrence. Recreational cavers and individuals passing near cave entrances can arouse bats. Too many occurrences can result in an excessive exhaustion of fat before the bats are able to replenish it during spring foraging. This can result in high mortality during the spring migrations. Vandalism, including the shooting and killing of large numbers of bats at hibernation sites, has been recorded.

Improper gate structures at cave entrances have rendered several caves unavailable for hibernation. In some instances, structures that do allow access have altered the air flow and temperature at a hibernaculum such that hibernating bats were not able to survive the winter as the increase in temperatures resulted in an increase in the metabolic rate resulting in premature exhaustion of fat reserves (USFWS, 1999). It should be noted that in areas where bat activity has been altered due to gates, etc., the installation of bat-friendly gates has resulted in re-establishment of the area as a hibernaculum, and population increases have been noted in some areas. Flooding, caving of mine ceilings, and freezes are among the natural hazards that have contributed to population declines.

Land use practices (fragmentation and loss of roosting and foraging habitat), and the use of pesticides are other suspected causes of population declines, however sufficient data does not exist to make a definitive statement.

3.2 Bald Eagle (*Haliaeetus leucocephalus*)

3.2.1 Species Description. The bald eagle is a large raptor. Adult males average 33 inches from head to tail, weigh up to 8.5 pounds, and have a wingspan of approximately 6.75 feet. Females are larger averaging 36 inches long and weighing 11 pounds, and have a wingspan of approximately 7.25 feet. The adults are dark brown with a distinctive white head and tail feathers. They have large pale eyes, a powerful yellow beak, black talons, and featherless yellow feet. Immature eagles are generally darker and have a dusky head and tail. They have a dark beak and mottled white under the wings and base of tail.

Eaglets are pale yellowish white or smoke gray with a pale head and lower parts and a dull white throat. By their first winter, the juvenile eagles are brown and mottled with pale brown or brownish white. As the eagle matures in four to five years, its head and tail become whiter. It may take up to nine years for the tail to become completely white (Oberholser 1974).

3.2.2 Taxonomic Status. The bald eagle belongs to the order Falconiformes, which contains vultures and diurnal birds of prey, and the family Accipitridae. Originally described as *Falco leucocephalus* by Linnaeus in *Systema Naturae*, 1766, the bald eagle was later renamed *Haliaetus leucocephalus* by Boie in *Isis*, 1882. The genus, later re-spelled as *Haliaeetus*, is derived from the Greek word *haliaetos* meaning "sea eagle," and the specific epithet, *leucocephalus*, meaning "white-headed."

3.2.3 Geographic Range. The bald eagle occurs over most of North America, from the northern reaches of Alaska and Canada to northeast Labrador, to the northern parts of Mexico and south to Baja California, Texas, the Gulf States, and Florida. Populations are much reduced over most of its range, but it is still common in coastal Alaska, British Columbia, and in lesser numbers, Florida. Although bald eagles may range over great distances, they usually return to nest within 100 miles of where they were raised.

In 1974, a nationwide bald eagle survey was conducted by the U.S. Fish and Wildlife Service, state agencies, and conservation groups to show population and reproduction success. They concluded that bald eagle populations and reproductive success were lower in he northern half of the 48 states than the southern areas (Federal Register, 1995).

3.2.4 Habitat. The bald eagle is a bird of aquatic ecosystems. They are found in associations with quiet coastal areas, estuaries, rivers, lakes, and reservoirs. Bald eagles build large stick nests lined with softer material such as leaves, moss, and grass. The same pair of eagles reuses a nest year after year. Tall trees or cliff edges are needed to support their large nest platforms, which may measure six feet in diameter and weigh hundreds of pounds.

During the winter, bald eagles congregate at specific wintering sites. They generally prefer open water areas that offer good perch trees and night roost (Federal Register, 1995). Currently, major threats to the bald eagle are destruction and degradation of its habitat and environmental contaminants.

3.2.5 Life History. Adult plumage is not acquired on bald eagles until four years of age at a minimum. Prior to obtaining adult plumage, bald eagles go through a series of plumages, some of which superficially resemble the golden eagle (*Aquila chrysaetos*). Sexual maturity is reached at four to six years with first breeding sometimes occurring later than this. The reasonable potential life span of a bald eagle is approximately 30 years under natural conditions. However, mortality is thought to be high in the immature age classes, with many birds probably not reaching sexual maturity and few likely to live to 30 years.

Nesting bald eagles are almost exclusively found near rivers, lakes or sea coasts (USFWS, 1983). Adult bald eagles generally use the same breeding areas and nests each year. Nest sites are primarily trees and cliffs with bald eagles rarely nesting on the ground. Bald eagle clutches include one to three eggs with successful pairs usually raising one or two young per nesting attempt. Egg laying usually occurs from November (Florida) to May (Alaska) with varying times being largely dependent on latitude. The period between egg laying and fledging is approximately four months.

Most bald eagles move south during the winter months (wintering period) as weather conditions and food availability change.

During the wintering period bald eagles are generally found near open water feeding on fish and waterfowl (dead or crippled). These eagles usually congregate at commercial roost trees at night and may range up to 20 kilometers from feeding areas to a roost site. It is suspected that bald eagles utilize commercial roost sites as they help minimize the energy stress encountered by wintering eagles, facilitates food finding, and provides isolation from human disturbance.

3.2.6 Status. It is estimated that there may have been as many as 25,000 to 75,000 nesting bald eagles in the lower 48 states in 1782. Since that time the bald eagle has suffered from habitat destruction, illegal shootings, and contamination from pesticides. In 1940 the eagle was protected through the establishment of the Bald Eagle Protection Act, which made it illegal to kill, harass, possess or sell bald eagles. The bald eagle was first listed as Federally endangered on March 11, 1967 (under a law, which preceded the Endangered Species Act). The species was classified as Federally endangered in 43 of the 48 contiguous United States in 1978.

3.2.7 Reasons for Decline. The bald eagle was subjected to illegal shootings as they, along with other raptors, were perceived by many as threats to domestic livestock. Loss of habitat also contributed to the decline of this species. As stated above, an act was passed providing protection to the bald eagle, however, species declines were still noted. This continued decline coincided with the introduction and widespread use of the insecticide dichloro-diphenyltrichloroethane (DDT) in 1947, and other organochlorine compounds. DDT runoff into rivers, lakes, etc., was absorbed by aquatic plants and small aquatic animals, which in turn contaminated fish (one of the eagle's primary food source). This chemical would accumulate in the fatty tissues of eagle prey and once ingested by eagles, adversely affected reproduction. Bald eagles contaminated with high levels of the DDT either no longer laid eggs or laid eggs with weak or thin shells that broke during the incubation period. Habitat loss associated with development and other land clearing activities has also contributed to the historic decline in the bald eagle populations.

3.3 Fat Pocketbook Mussel (*Potamilus capax*)

3.3.1 Species Description. The shell of the fat pocketbook mussel is round to somewhat oblong, thin (young) to relatively thick (adults), with the anterior and posterior ends rounded. The umbo (oldest part of the bivalved shell readily identified as the raised parts on the dorsal margin of each of the shell valves, and sometimes referred to as the beak) is greatly inflated, elevated and turned inward. The beak sculpture has faint ridges, which are mostly visible in the younger shells only. The beak cavity is very deep and large. The periostracum (thin external layer composed of protein surrounding most mollusk shells) is smooth, yellow to brown in color with narrow yellow bands sometimes present parallel to the growth lines. The average length of the shells is approximately five inches.

The nacre (inner layer of the shell) is bluish-white to occasionally pink inside the pallial line and often has an iridescent bluish border. Pseudocardinal teeth (two in each valve) are thin compressed and elevated. Lateral teeth (two in the left valve and one in the right valve) are thin and very curved. The fat pocketbook mussel is not sexually dimorphic. The fat pocketbook mussel resembles the more common *Lampsilis ovata* and can be distinguished by the yellow-brown periostracum, absence of rays, and the lack of sexual dimorphism.

3.3.2 Taxonomic Status. The fat pocketbook mussel is in the phylum Mollusca, class Bivalvia, order Unionoida, and family Unionidae. This species was first described as *Unio capax* in 1832, and as *Symphynota globosa* in the same year. It was then moved to the genus *Proptera* where it remained for approximately 50 years. The genus *Proptera* was described in 1819, however the same genus had been described earlier in 1818 as *Potamilus*. Today, those malacologists who prefer the rule of priority refer to this species as *Potamilus capax* whereas those preferring the "50 year rule" use the genus *Proptera*.

3.3.3 Geographic Range. The fat pocketbook mussel inhabits waterways ranging from main channels of large rivers to small ditches in portions of Arkansas, Illinois, Indiana, Kentucky, Louisiana, Missouri, Mississippi, New York, and Texas. Its presence in the vicinity of the project area has been documented in the Wabash River in Indiana, and also in the Ohio River in Illinois. It has also been reported in portions of the upper and lower Illinois River in Illinois, and in small populations within the mainstream of the Mississippi River from Wabash, Minnesota, to Grafton, Illinois.

3.3.4 Habitat. Generally, these mussels can be found in slow to medium flowing streams (the majority of which are approximately eight feet deep) with mud, sand, or gravel bottoms. Nothing is known about the specific requirements for adults or any other life stage.

3.3.5 Life History. The majority of the adult mussels remain entrenched in their environment throughout their lives. Shells remain partially to totally buried in the substrate, with the shells partially open to allow the intake of nutrients, and the excretion of wastes. The foot serves as the anchor for the mussel. The females have larger shells than do the males to accommodate the young during the embryonic stage. Fat pocketbook mussels reproduce similar to that of other freshwater mussels. Spawning generally occurs in the summer with the glochida (larvae) retained through the fall and winter, and released during the late spring and early summer. Males discharge sperm into the water column, which is taken in by the females during a process known as siphoning. The eggs are fertilized in the gills and remain through embryo development into the larvae stage. The larvae, which are obligate parasites on gills or fins of freshwater fishes, are then released and must attach to a host in order to survive. Once released, no other parental care is given. These larvae are generally not visible on the host but may appear as small white dots attached to gills, fins, or other external surfaces on a fish. The larvae remain on the fish from one to six weeks during which time they do not grow noticeably and are apparently harmless to the host. Upon reaching the juvenile stage, they detach from the host and fall to the bottom becoming independent mussels.

These mussels are generally sedentary; therefore all life history processes including reproduction generally takes place in the same environment. However, these mussels have been known to move voluntarily to avoid drying, high temperatures, or other life-threatening conditions.

3.3.6 Status. The fat pocketbook mussel was first listed as endangered on June 14, 1976. This species is also protected under the Lacy Act (P.L. 97-79, as amended; 16 U.S.C. 3371 *et seq*. The historic population was estimated at 11,000 to 24,000 individuals, however recent surveys show that this species only comprises approximately one percent of the total mussel population.

3.3.7 Reasons for Decline. The reason for decline has been largely attributed to loss or significant impacts to habitat. The most significant impact on the habitat is associated with navigational and flood control activities, channalization, and dredging operations. Other conditions associated with these activities, which can be attributed to declines in populations, include alteration of the oxygen levels in the water, increased siltation, altered flow patterns, and manipulation of the species composition among fishes which may impact reproduction. Water pollution is an expected cause of species decline, but there is not sufficient documentation of non-point source pollution impacts to list this as a definitive cause.

4.0 POTENTIAL CONSEQUENCES

4.1 Construction

4.1.1 Indiana Bat. Construction would include an access road, which would traverse an existing open prairie, and dredging associated with the proposed project. No preferred Indiana bat habitat would be impacted during the construction phase of the proposed project.

4.1.2 Bald Eagle. Construction would include the construction of an access road, which would traverse an existing open prairie, and dredging associated with the proposed project. Some potential bald eagle foraging habitat may be affected (increased sedimentation during construction, and alteration of the riparian habitat associated with bank shaving) during the construction phase of the proposed project. However, these impacts would be temporal and are not considered significant as sufficient foraging habitat exists adjacent to the proposed construction areas.

4.1.3 Fat Pocketbook Mussel. THIS SECTION WILL BE COMPLETED UPON COMPLETION OF THE MUSSEL SURVEY.

4.2 On-Site Disposal of Dredge Material

4.2.1 Indiana Bat. On-site disposal would require the temporary loss of approximately 20.4 acres of prairie, 63.6 acres of frequently maintained openland and approximately ten acres of scrub shrub habitat. Both of these communities are adjacent or near the water, and may be used in the spring and summer as foraging habitat. It is not likely that the entire open area would be impacted simultaneously, and sufficient foraging habitat would remain during the project construction. As these areas would be restored to pre-project conditions upon completion of the project, no adverse affects to the Indiana bat or habitat are expected.

The proposed project would require an approximately 100-foot-wide area landward from the Ohio River along the right descending bank downstream approximately 0.5 miles to be removed to allow for barge alignment with the new lock extension. Currently this area is dominated by black willow (*Salix nigra*) along the first shelf of the riverbank, transitioning to a silver maple (*Acer saccharinum*) stand. The majority of the potential roost trees are present landward of the river, especially in the vicinity of Little Pitcher Lake. The clearing associated with this phase of the project is considered minor, and if it is performed outside of the summer occupancy period (April 15–September 15), there would likely be no adverse affects to the Indiana bat, or its preferred habitat.

4.2.2 Bald Eagle. The area targeted for on-site disposal of dredge material associated with the proposed project does not contain bald eagle nesting, or roosting habitat and therefore would not affect bald eagles.

4.2.3 Fat Pocketbook Mussel. THIS SECTION WILL BE COMPLETED UPON COMPLETION OF THE MUSSEL SURVEY.

4.3 Off-Site Disposal On State Owned Lands

4.3.1 Indiana Bat. This area is currently maintained for crop production and may be used for foraging by the Indiana bat in the spring and summer. Under the contemporary design and the beneficial use of the dredge material design, the area would remain open and could continue to be used for foraging. Off-site disposal of dredge material would not likely effect the Indiana bat or its preferred habitat.

4.3.2 Bald Eagle. The proposed site is adjacent to the Hovey Lake Wildlife Management Area and is currently being used for crop production. One bald eagle nest is approximately 0.8 miles from the proposed site. The contemporary disposal design and beneficial use of the dredge material would not alter any bald eagle nesting or roosting habitat, and therefore would not affect bald eagles or their preferred habitat.

4.3.3 Fat Pocketbook Mussel. No fat pocketbook mussel habitat exists at this proposed disposal site. Therefore, the proposed disposal of dredge material (contemporary or beneficial use design) would not affect the fat pocketbook mussel.

4.4 Off-Site Disposal On Privately Owned Land

4.4.1 Indiana Bat. The area targeted for disposal is currently used for crop production. It is openland and surrounded by mature bottomland hardwoods, which contain potential Indiana bat summer nesting and roosting habitat. The proposed disposal area may be used for foraging by Indiana bats during the spring and summer. Under the contemporary design, the area would remain croplands and could continue to be used for foraging. Therefore, under this scenario, no affects to the Indiana bat are expected.

Under the beneficial use of the dredge material design, the area would be replanted in bottomland hardwoods thereby reducing forest fragmentation in the area (a suspected cause of species decline) and provide future summer nesting and roosting habitat for the Indiana bat. There is sufficient open agriculture land in the area to offset any foraging habitat for the Indiana bat. This scenario is expected to have a beneficial affect on the Indiana bat.

4.4.2 Bald Eagle. The proposed site is southwest of the Hovey Lake Wildlife Management Area and is currently being used for crop production. One bald eagle nest is approximately three miles from the proposed site. The contemporary disposal design and beneficial use of the dredge material would not alter any bald eagle nesting or roosting habitat, and therefore would not affect bald eagles or their preferred habitat.

4.4.3 Fat Pocketbook Mussel. No fat pocketbook mussel habitat exists at this proposed disposal site. Therefore, the proposed disposal of dredge material (contemporary or beneficial use design) would not affect the fat pocketbook mussel.

4.5 No-Action. Under the no-action alternative no adverse impacts to the Indiana bat, bald eagle or the fat pocketbook mussel or their preferred habitat would likely occur.

5.0 SUMMARY AND CONCLUSIONS

There are no known Indiana bat populations or bald eagle nests located on any of the proposed disposal sites, however potential habitats for the bald eagle and Indiana bat are present on the site adjacent to the locks and dam, particularly around Little Pitcher Lake. Little Pitcher Lake is located north of any proposed on-site disposal areas.

Both of the proposed off-site disposal areas contain open land that may possibly be used for foraging in the spring and summer by Indiana bats. Under both of the alternative disposal designs these areas would remain open and could continue to be used for foraging with the exception of the off-site private property disposal site. This area would be restored to a bottomland hardwood community under the beneficial use design and would provide future roosting and nesting habitat for the Indiana bat.

On-site disposal would not likely affect the bald eagle, or the fat pocketbook mussel. Assuming that the land clearing would be performed outside of the summer occupancy period (April 15–September 15), there would likely be no adverse affects to the Indiana bat or its preferred habitat.

Off-site disposal on State-owned or private lands would not likely affect the Indiana bat, the bald eagle, or the fat pocketbook mussel. Further, beneficial affects for the Indiana bat could occur under the beneficial use of dredge material design on the private lands.

Construction would include dredging approximately 500,000 cubic yards of material from the Ohio River, and removing an approximate 100' by 1,000' section of the right descending bank below the J.T. Myers Locks and Dam. No preferred Indiana bat habitat would be adversely affected during the construction phase of the project. Some potential bald eagle foraging habitat may be affected (increased sedimentation during construction, and alteration of the riparian habitat associated with bank shaving) during the construction phase of the proposed project. However, these impacts would be temporal and are not considered significant as sufficient foraging habitat exists adjacent to the proposed construction areas to affect these temporary impacts.

Under the no-action alternative, no construction and dredging would occur associated with lock expansion activities. Therefore, no adverse impacts to the Indiana bat, bald eagle, or the fat pocketbook mussel would likely occur.

If additional data becomes available that would contradict the results contained herein, or if the proposed project is significantly altered, it may be necessary to reevaluate species impacts.

6.0 REFERENCES

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J.T. Myers Locks Improvements

Part A-3. Terrestrial Cover Types